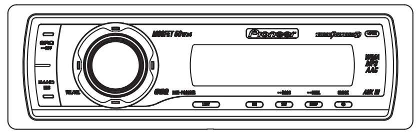
Pioneer sound.vision.soul

Service Manual



DEH-P6950IB/XN/ES

ORDER NO.
CRT3853

CD RECEIVER

DEH-P6950IB/XN/ES
DEH-P6950IB/XN/ES1

This service manual should be used together with the following manual(s):

Model No.	Order No.	Mech.Module	Remarks
CX-3195	CRT3815	S10.5COMP2	CD Mech. Module : Circuit Descriptions, Mech. Descriptions, Disassembly



For details, refer to "Important Check Points for Good Servicing".

PIONEER CORPORATION 4-1, Meguro 1-chome, Meguro-ku, Tokyo 153-8654, Japan
PIONEER ELECTRONICS (USA) INC. P.O. Box 1760, Long Beach, CA 90801-1760, U.S.A.
PIONEER EUROPE NV Haven 1087, Keetberglaan 1, 9120 Melsele, Belgium
PIONEER ELECTRONICS ASIACENTRE PTE. LTD. 253 Alexandra Road, #04-01, Singapore 159936

K-ZZU. DEC. 2006 Printed in Japan

SAFETY INFORMATION

CAUTION

This service manual is intended for qualified service technicians; it is not meant for the casual do-it-yourselfer.
Qualified technicians have the necessary test equipment and tools, and have been trained to properly and safely repair complex products such as those covered by this manual.
Improperly performed repairs can adversely affect the safety and reliability of the product and may void the warranty.
If you are not qualified to perform the repair of this product properly and safely, you should not risk trying to do so and refer the repair to a qualified service technician.

WARNING

This product contains lead in solder and certain electrical parts contain chemicals which are known to the state of California to cause cancer, birth defects or other reproductive harm.
Health & Safety Code Section 25249.6 - Proposition 65

● Safety Precautions for those who Service this Unit.

- When checking or adjusting the emitting power of the laser diode exercise caution in order to get safe, reliable results.

Caution:

1. During repair or tests, minimum distance of 13 cm from the focus lens must be kept.
2. During repair or tests, do not view laser beam for 10 seconds or longer.

CAUTION

Danger of explosion if battery is incorrectly replaced.
Replaced only with the same or equivalent type recommended by the manufacture.
Discord used batteries according to the manufacture's instructions.

● Service Precaution

1. You should conform to the regulations governing the product (safety, radio and noise, and other regulations), and should keep the safety during servicing by following the safety instructions described in this manual.
2. Before disassembling the unit, be sure to turn off the power. Unplugging and plugging the connectors during power-on mode may damage the ICs inside the unit.
3. To protect the pickup unit from electrostatic discharge during servicing, take an appropriate treatment (shorting-solder) by referring to "the DISASSEMBLY".
4. After replacing the pickup unit, be sure to check the grating.
5. Be careful in handling ICs. Some ICs such as MOS type are so fragile that they can be damaged by electrostatic induction.

[Important Check Points for Good Servicing]

In this manual, procedures that must be performed during repairs are marked with the below symbol.
Please be sure to confirm and follow these procedures.

1. Product safety

Please conform to product regulations (such as safety and radiation regulations), and maintain a safe servicing environment by following the safety instructions described in this manual.

① Use specified parts for repair.

Use genuine parts. Be sure to use important parts for safety.

② Do not perform modifications without proper instructions.

Please follow the specified safety methods when modification(addition/change of parts) is required due to interferences such as radio/TV interference and foreign noise.

③ Make sure the soldering of repaired locations is properly performed.

When you solder while repairing, please be sure that there are no cold solder and other debris.
Soldering should be finished with the proper quantity. (Refer to the example)

④ Make sure the screws are tightly fastened.

Please be sure that all screws are fastened, and that there are no loose screws.

⑤ Make sure each connectors are correctly inserted.

Please be sure that all connectors are inserted, and that there are no imperfect insertion.

⑥ Make sure the wiring cables are set to their original state.

Please replace the wiring and cables to the original state after repairs.
In addition, be sure that there are no pinched wires, etc.

⑦ Make sure screws and soldering scraps do not remain inside the product.

Please check that neither solder debris nor screws remain inside the product.

⑧ There should be no semi-broken wires, scratches, melting, etc. on the coating of the power cord.

Damaged power cords may lead to fire accidents, so please be sure that there are no damages.
If you find a damaged power cord, please exchange it with a suitable one.

⑨ There should be no spark traces or similar marks on the power plug.

When spark traces or similar marks are found on the power supply plug, please check the connection and advise on secure connections and suitable usage. Please exchange the power cord if necessary.

⑩ Safe environment should be secured during servicing.

When you perform repairs, please pay attention to static electricity, furniture, household articles, etc. in order to prevent injuries.
Please pay attention to your surroundings and repair safely.

2. Adjustments

To keep the original performance of the products, optimum adjustments and confirmation of characteristics within specification.
Adjustments should be performed in accordance with the procedures/instructions described in this manual.

3. Lubricants, Glues, and Replacement parts

Use grease and adhesives that are equal to the specified substance.
Make sure the proper amount is applied.

4. Cleaning

For parts that require cleaning, such as optical pickups, tape deck heads, lenses and mirrors used in projection monitors, proper cleaning should be performed to restore their performances.

5. Shipping mode and Shipping screws

To protect products from damages or failures during transit, the shipping mode should be set or the shipping screws should be installed before shipment. Please be sure to follow this method especially if it is specified in this manual.

CONTENTS

1. SPECIFICATIONS

General

Rated power source .... 14.4 V DC (allowable voltage range: 12.0 V to 14.4 V DC)
Grounding system .... Negative type
Max. current consumption .... 10.0 A
Backup current .... 5 mA or less

Dimensions (W × H × D):
- DIN
  - Chassis .... 178 × 50 × 162 mm
  - Nose .... 188 × 58 × 15 mm
- D
  - Chassis .... 178 × 50 × 162 mm
  - Nose .... 170 × 46 × 15 mm

Weight .... 1.5 kg

Audio

Maximum power output .... 50 W × 4
50 W × 2/4 Ω + 70 W × 1/2 Ω (for subwoofer)
Continuous power output ... 22 W × 4 (50 Hz to 15 000 Hz, 5% THD, 4 Ω load, both channels driven)
Load impedance .... 4 Ω to 8 Ω × 4
4 Ω to 8 Ω × 2 + 2 Ω × 1
Preout max output level/output impedance 4 V/100Ω
Equalizer (7-Band Graphic Equalizer):
- Frequency .... 50/125/315/800/2k/5k/12.5k Hz
- Gain .... ±12 dB

Loudness contour:
- Low .... +3.5 dB (100 Hz), +3 dB (10 kHz)
- Mid .... +10 dB (100 Hz), +6.5 dB (10 kHz)
- High .... +11 dB (100 Hz), +11 dB (10 kHz)

(volume: –30 dB)

HPF:
- Frequency .... 50/63/80/100/125 Hz
- Slope .... –12 dB/oct

Subwoofer (mono):
- Frequency .... 50/63/80/100/125 Hz
- Slope .... –18 dB/oct
- Gain .... +6 dB to –24 dB
- Phase .... Normal/Reverse

Bass boost:
- Gain .... +12 dB to 0 dB

CD player

System .... Compact disc audio system
Usable discs .... Compact disc
Signal format:
- Sampling frequency ..... 44.1 kHz
- Number of quantization bits .... 16; linear

Frequency characteristics ... 5 Hz to 20 000 Hz (±1 dB)
Signal-to-noise ratio .... 94 dB (1 kHz) (IEC-A network)
Dynamic range .... 92 dB (1 kHz)
Number of channels .... 2 (stereo)
MP3 decoding format .... MPEG-1 & 2 Audio Layer 3
WMA decoding format .... Ver. 7, 7.1, 8, 9, 10 (2ch audio) (Windows Media Player)
AAC decoding format .... MPEG-4 AAC (iTunes® encoded only)
WAV signal format .... Linear PCM & MS ADPCM

FM tuner

Frequency range .... 87.5 MHz to 108.0 MHz
Usable sensitivity .... 8 dBf (0.7 µV/75 Ω, mono, S/N: 30 dB)
Signal-to-noise ratio .... 75 dB (IEC-A network)
Distortion .... 0.3 % (at 65 dBf, 1 kHz, stereo)
0.1 % (at 65 dBf, 1 kHz, mono)
Frequency response .... 30 Hz to 15 000 Hz (±3 dB)
Stereo separation .... 45 dB (at 65 dBf, 1 kHz)

AM tuner

Frequency range .... 531 kHz to 1 602 kHz (9 kHz)
530 kHz to 1 640 kHz (10 kHz)
Usable sensitivity .... 18 µV (S/N: 20 dB)
Signal-to-noise ratio .... 65 dB (IEC-A network)

Infrared remote control

Wavelength .... 940 nm ±50 nm
Output .... typ; 12 mw/sr per Infrared LED

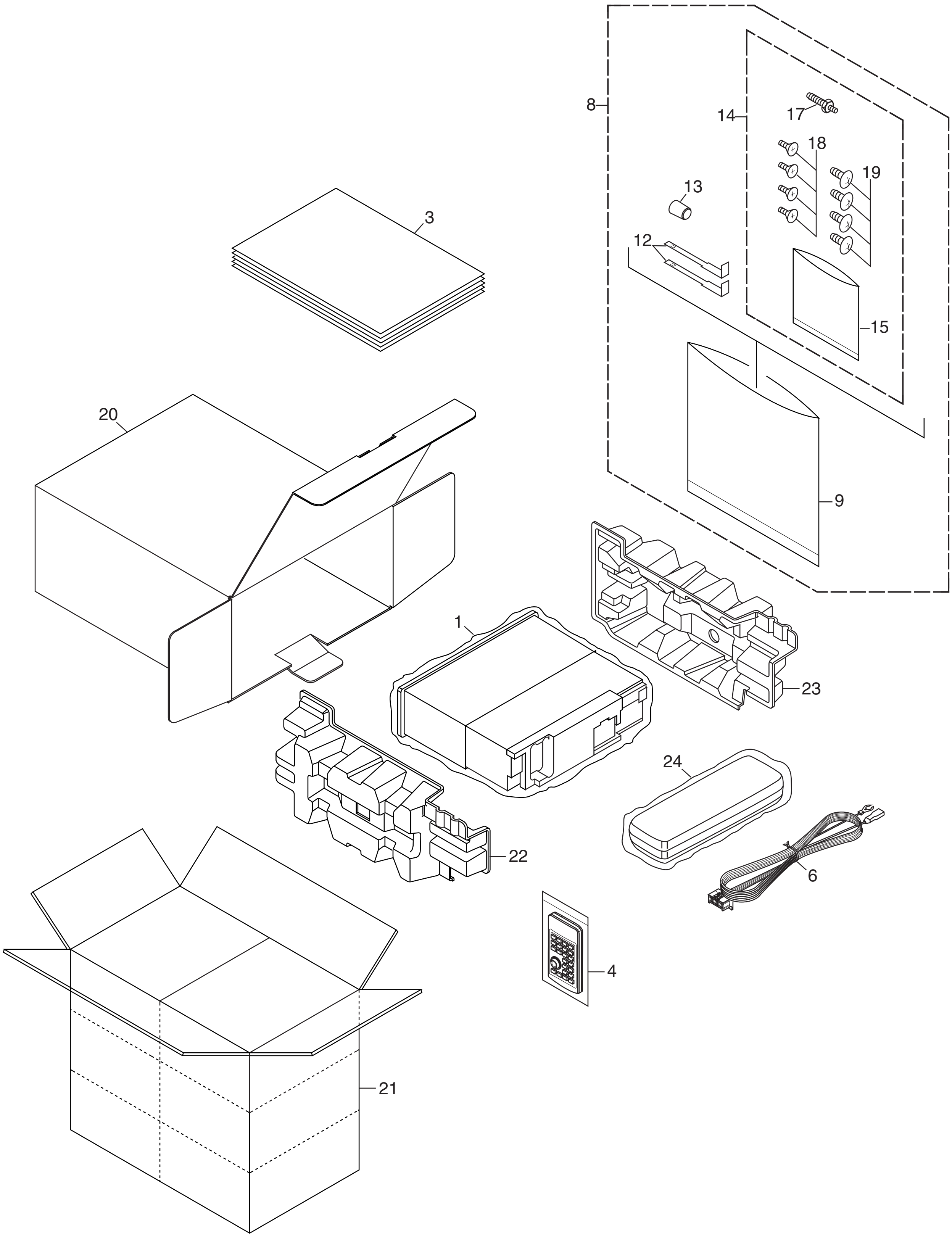
Note

Specifications and the design are subject to possible modifications without notice due to improvements. ■

2. EXPLODED VIEWS AND PARTS LIST

NOTES : • Parts marked by "" are generally unavailable because they are not in our Master Spare Parts List.*
• The ⚠ mark found on some component parts indicates the importance of the safety factor of the part. Therefore, when replacing, be sure to use parts of identical designation.
• Screw adjacent to ▽ mark on the product are used for disassembly.
• For the applying amount of lubricants or glue, follow the instructions in this manual. (In the case of no amount instructions, apply as you think it appropriate.)

2.1 PACKING



(1) PACKING SECTION PARTS LIST

Mark	No.	Description	Part No.
	1	Polyethylene Bag	CEG-162
	2	•••••	
	3-1	Caution Card	CRP1310
*	3-2	Warranty Card	See Contrast table (2)
	3-3	Owner's Manual	XRD7144
	3-4	Owner's Manual	XRD7145
	3-5	Installation Manual	XRD7146
*	3-6	Caution Card	XRP7002
*	3-7	Service Network	See Contrast table (2)
	4	Remote Control Unit	CXC5717
	5	Cord Assy	XDE7026
	6	Cord Assy	XDP7004
	7	•••••	
	8	Accessory Assy	CEA6708
	9	Polyethylene Bag	CEG1160
	10	•••••	

Mark	No.	Description	Part No.
	11	•••••	
	12	Handle	CND3707
	13	Bush	CNV3930
	14	Screw Assy	CEA3849
*	15	Polyethylene Bag	CEG-127
	16	•••••	
	17	Screw	CBA1650
	18	Screw	CRZ50P090FTC
	19	Screw	TRZ50P080FTC
	20	Unit Box	See Contrast table (2)
	21	Contain Box	See Contrast table (2)
	22	Protector	XHP7016
	23	Protector	XHP7017
	24	Case Assy	XXA7417

(2) CONTRAST TABLE

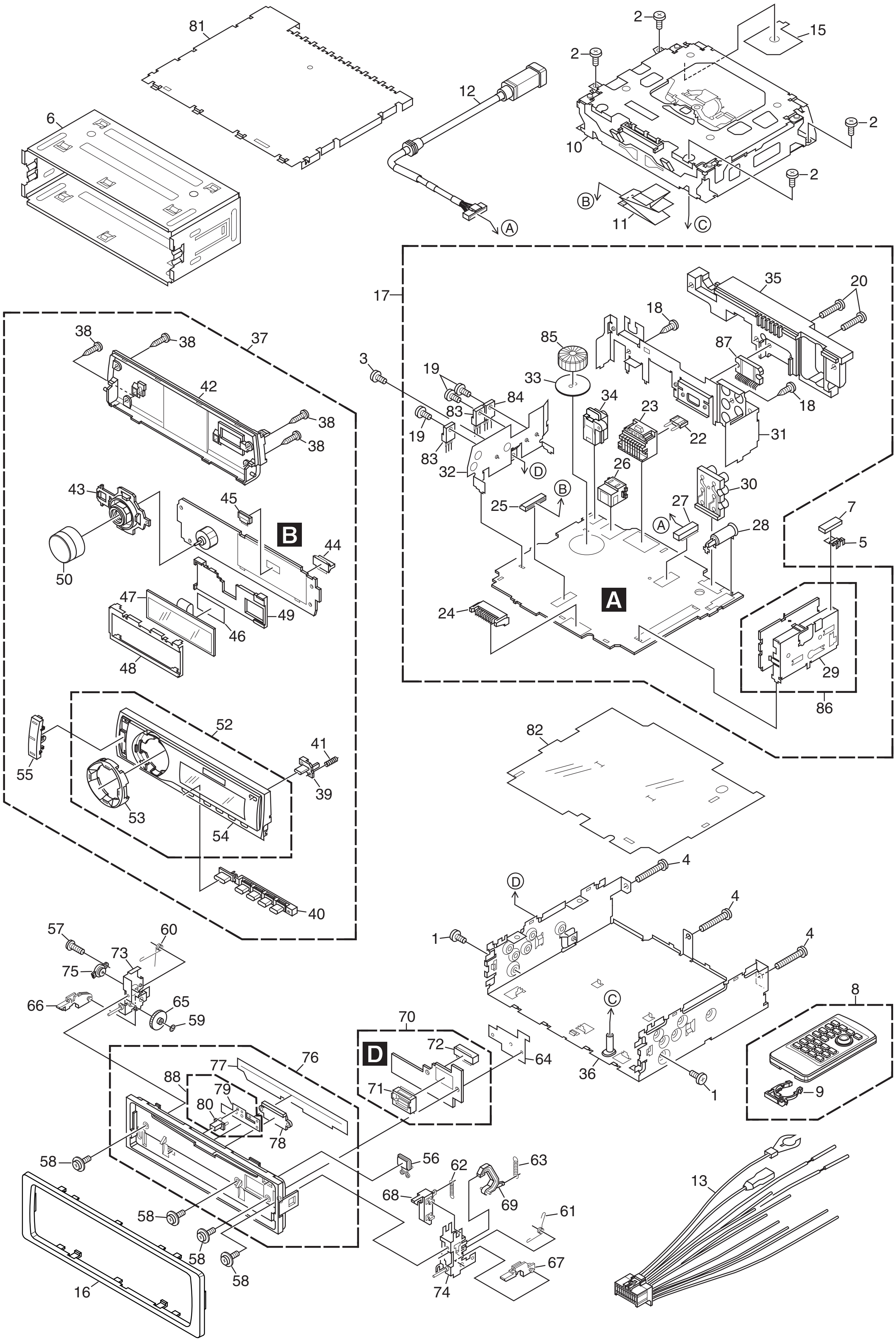
DEH-P6950IB/XN/ES and DEH-P6950IB/XN/ES1 are constructed the same except for the following:

Mark	No.	Description	DEH-P6950IB/XN/ES	DEH-P6950IB/XN/ES1
*	3-2	Warranty Card	Not used	CRY1250
*	3-7	Service Network	Not used	CRY1251
	20	Unit Box	XHG7138	XHG7145
	21	Contain Box	XHL7138	XHL7145

Owner's Manual,Installation Manual

Part No.	Language
XRD7144	English, Spanish, Portuguese(B)
XRD7145	Arabic, Traditional Chinese
XRD7146	English, Spanish, Portuguese(B), Arabic, Traditional Chinese

2.2 EXTERIOR



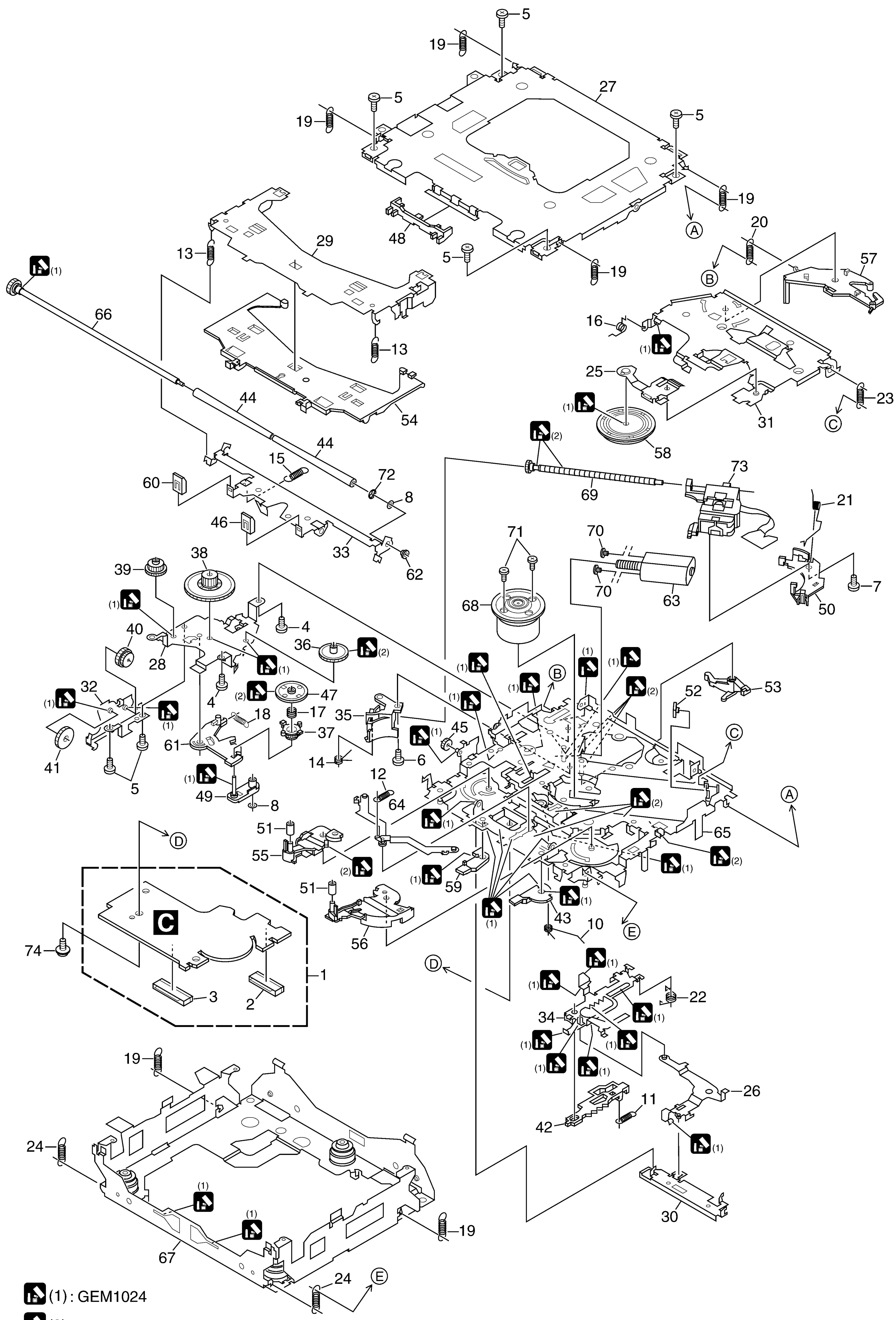
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EXTERIOR SECTION PARTS LIST

Mark	No.	Description	Part No.
	1	Screw	BMZ30P040FTB
	2	Screw	BSZ26P060FTC
	3	Screw	BSZ30P060FTC
	4	Screw	BSZ30P200FTC
	5	Earth Plate	CNC8915
	6	Holder	CND3598
	7	Cushion	CNM8890
	8	Remote Control Unit	CXC5717
	9	Cover	CZN5357
	10	CD Mechanism Module(S10.5)	CXK5763
	11	Cable	XDE7022
	12	Cord Assy	XDE7026
	13	Cord Assy	XDP7004
	14	•••••	
	15	Insulator	XNM7106
	16	Panel	XNS7181
	17	Tuner Amp Unit	XWM7166
	18	Screw	BPZ26P070FTC
	19	Screw	BSZ26P060FTC
	20	Screw	BSZ26P200FTC
	21	•••••	
⚠	22	Fuse(10 A)	CEK1208
	23	Plug(CN901)	CKM1376
	24	Plug(CN801)	CKS3537
	25	Connector(CN651)	CKS3829
	26	Connector(CN101)	CKS5271
	27	Connector(CN701)	CKS5691
	28	Antenna Jack(CN401)	CKX1056
	29	Holder	CND1054
	30	Pin Jack(CN352)	XKB7001
	31	Holder	XNC7026
	32	Holder	XNC7030
	33	Insulator	XNM7031
	34	Jack(CN171)	XKS7006
	35	Heat Sink	YNR5031
	36	Chassis Unit	XXA7507
	37	Detachable Assy	XXA7520
	38	Screw	BPZ20P080FTB
	39	Button	XAC7149
	40	Button	XAC7156
	41	Spring	XBH7001
	42	Cover	XNS7180
	43	Lighting Conductor	XNV7035
	44	Connector(CN1801)	CKS5207
	45	Connector(CN1802)	CKS5545
	46	Double side Tape	CNM8673
	47	OEL Unit	MXS8231
	48	Holder	XNC7009
	49	Holder	XNV7029

Mark	No.	Description	Part No.
	50	Knob Unit	XXA7493
	51	•••••	
	52	Sub Grille Assy	XXA7502
	53	Plate	XNS7196
	54	Grille Unit	XXA7506
	55	Button Unit	XXA7508
	56	Button	CAC7752
	57	Screw(M2 x 4)	CBA1649
	58	Screw	CBA1925
	59	Washer	CBF1038
	60	Spring	CBH2650
	61	Spring	CBH2651
	62	Spring	CBH2652
	63	Spring	CBH2653
	64	Holder	CND1254
	65	Gear	CNV5997
	66	Arm	CNV7400
	67	Arm	CNV7401
	68	Arm	CNV7402
	69	Arm	CNV7403
	70	Panel Unit	CWM8758
	71	Connector(CN1951)	CKS4806
	72	Connector(CN1950)	CKS5192
	73	Holder Unit	CXB9501
	74	Holder Unit	CXB9502
	75	Damper Unit	CXB9503
	76	Sub Panel Assy	XXA7511
	77	Cover	CNM6854
	78	Lighting Conductor	CNV6487
	79	Spring	CBL1512
	80	Pin	CNV6486
	81	Case	YNB5014
	82	Insulator	YNM5062
	83	Transistor(Q650,911)	2SD2396
	84	IC(IC901)	NJM2388F84
	85	Choke Coil(L901)	CTH1280
	86	FM/AM Tuner Unit	CWE1952
	87	IC(IC301)	PAL007C
	88	Sub Spring Assy	XXA7363

2.3 CD MECHANISM MODULE



(1) : GEM1024

(2) : GEM1045

CD MECHANISM MODULE SECTION PARTS LIST

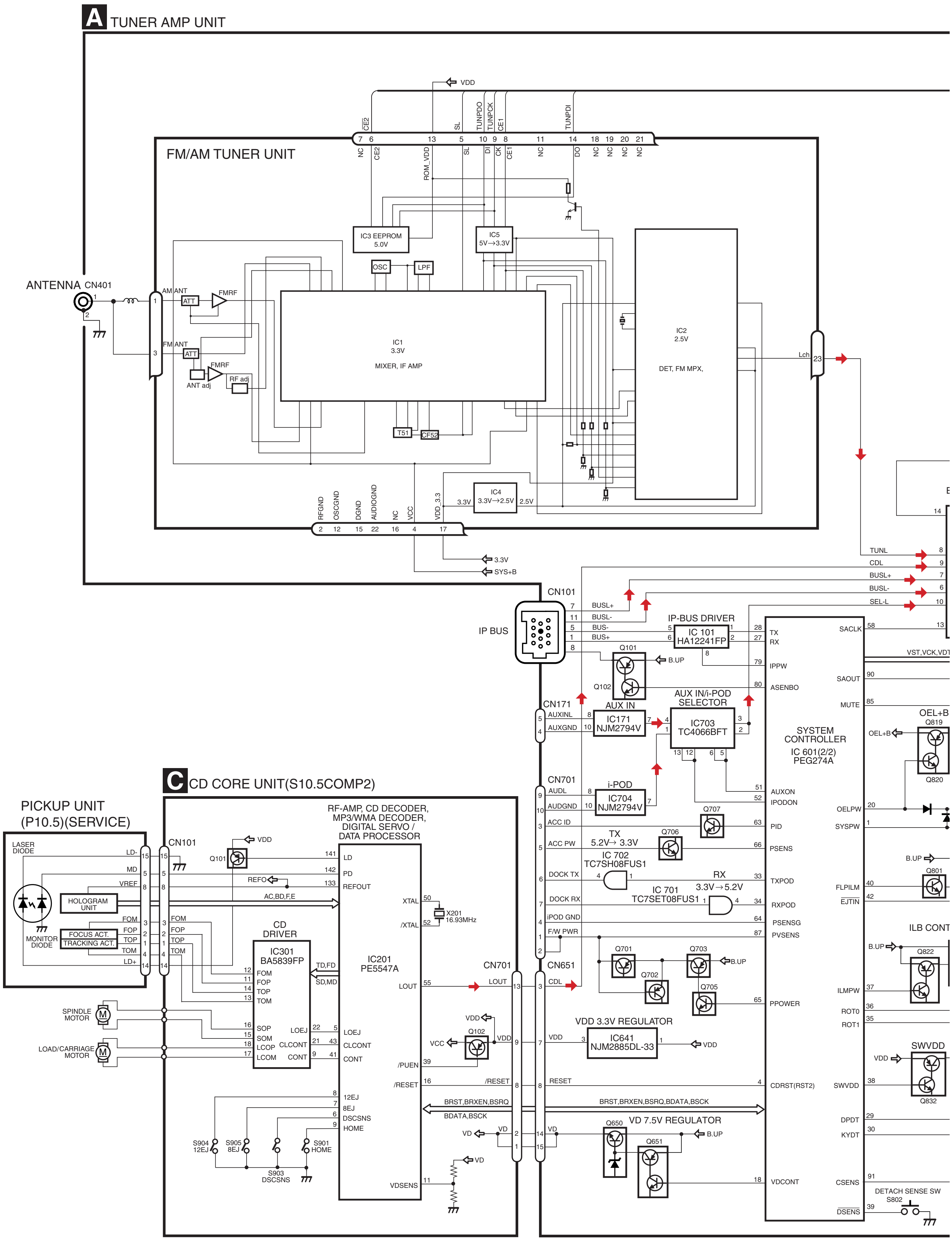
Mark	No.	Description	Part No.
	1	CD Core Unit(S10.5COMP2)	CWX3514
	2	Connector(CN101)	CKS4182
	3	Connector(CN701)	CKS4808
	4	Screw	BMZ20P025FTC
	5	Screw	BSZ20P040FTC
	6	Screw(M2 x 3)	CBA1511
	7	Screw(M2 x 4)	CBA1835
	8	Washer	CBF1038
	9	•••••	
	10	Spring	CBH2609
	11	Spring	CBH2612
	12	Spring	CBH2614
	13	Spring	CBH2616
	14	Spring	CBH2617
	15	Spring	CBH2620
	16	Spring	CBH2855
	17	Spring	CBH2937
	18	Spring	CBH2735
	19	Spring	CBH2854
	20	Spring	CBH2642
	21	Spring	CBH2856
	22	Spring	CBH2857
	23	Spring	CBH2860
	24	Spring	CBH2861
	25	Spring	CBL1686
	26	Arm	CND1909
	27	Frame	CND2582
	28	Bracket	CND2583
	29	Arm	CND2584
	30	Lever	CND2585
	31	Arm	CND2586
	32	Bracket	CND2587
	33	Arm	CND2588
	34	Lever	CND2589
	35	Holder	CNV7201
	36	Gear	CNV7207
	37	Gear	CNV7208
	38	Gear	CNV7209
	39	Gear	CNV7210
	40	Gear	CNV7211
	41	Gear	CNV7212
	42	Rack	CNV7214
	43	Arm	CNV7216
	44	Roller	CNV7218
	45	Gear	CNV7219
	46	Guide	CNV7361
	47	Gear	CNV7595
	48	Guide	CNV7799
	49	Arm	CNV7805

Mark	No.	Description	Part No.
	50	Rack	CNV8342
	51	Roller	CNV8343
	52	Holder	CNV8344
	53	Arm	CNV8345
	54	Guide	CNV8347
	55	Arm	CNV8348
	56	Arm	CNV8349
	57	Arm	CNV8350
	58	Clamper	CNV8365
	59	Arm	CNV8386
	60	Guide	CNV8396
	61	Arm	CNV8413
	62	Collar	CNV8938
	63	Motor Unit(M2)	CXC4026
	64	Arm Unit	CXC4027
	65	Chassis Unit	CXC4028
	66	Gear Unit	CXC4029
	67	Frame Unit	CXC4031
	68	Motor Unit(M1)	CXC7134
	69	Screw Unit	CXC6359
	70	Screw	JFZ20P020FTC
	71	Screw	JGZ17P022FTC
	72	Washer	YE20FTC
	73	Pickup Unit(P10.5)(Service)	CXX1942
	74	Screw	IMS26P030FTC

A B C D E F

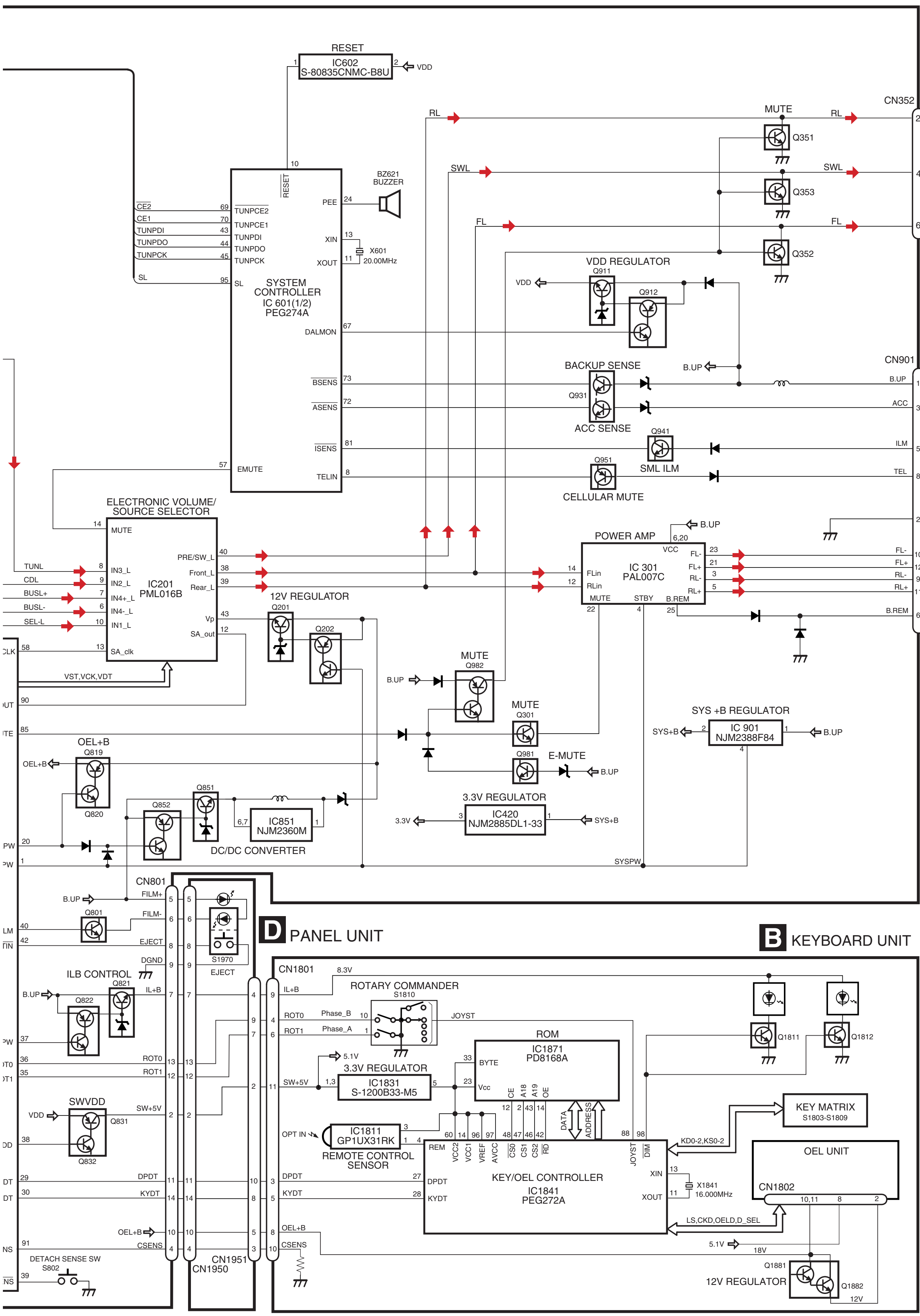
3. BLOCK DIAGRAM AND SCHEMATIC DIAGRAM

3.1 BLOCK DIAGRAM



5 6 7 8

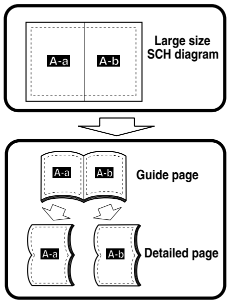
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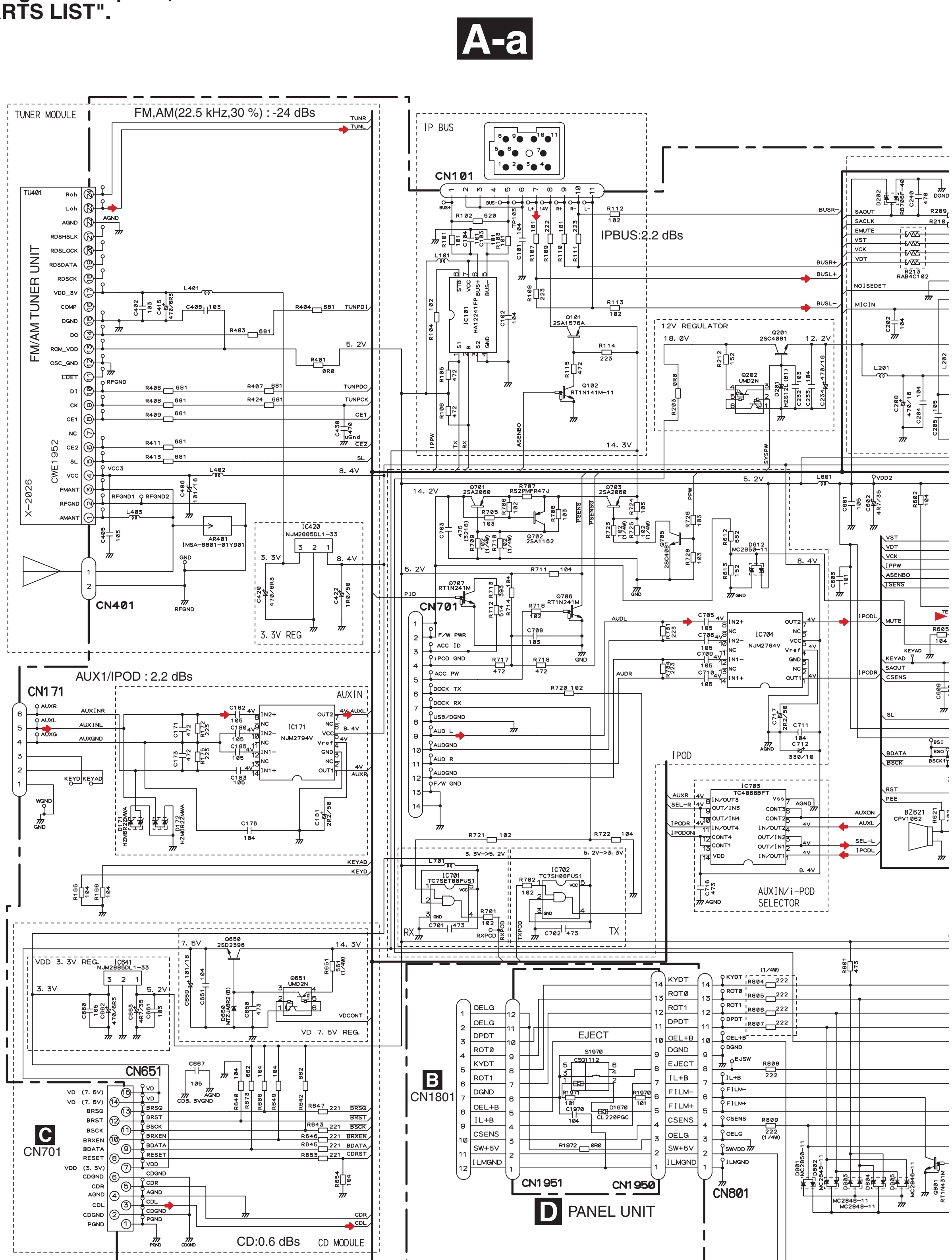


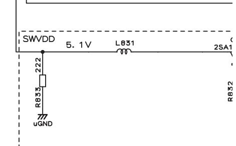
RESET
IC602
S-80835CNMC-B8U
VDD
SYSTEM CONTROLLER
IC 601(1/2)
PEG274A
BZ621
BUZZER
X601
20.00MHz
RL
SWL
FL
MUTE
Q351
Q353
Q352
CN352
VDD REGULATOR
Q911
Q912
BACKUP SENSE
Q931
ACC SENSE
Q941
SML ILM
Q951
CELLULAR MUTE
CN901
B.UP
ACC
ILM
TEL
GND
FL-
FL+
RL-
RL+
B.REM
ELECTRONIC VOLUME/
SOURCE SELECTOR
IC201
PML016B
POWER AMP
IC 301
PAL007C
12V REGULATOR
Q201
Q202
MUTE
Q982
MUTE
Q301
Q981
E-MUTE
SYS +B REGULATOR
IC 901
NJM2388F84
3.3V REGULATOR
IC420
NJM2885DL1-33
OEL+B
Q819
Q820
Q851
Q852
IC851
NJM2360M
DC/DC CONVERTER
CN801
Q801
S1970
EJECT
ILB CONTROL
Q821
Q822
SWVDD
Q831
Q832
DETACH SENSE SW
S802
CN1951
CN1950
D PANEL UNIT
B KEYBOARD UNIT
CN1801
ROTARY COMMANDER
S1810
ROM
IC1871
PD8168A
3.3V REGULATOR
IC1831
S-1200B33-M5
IC1811
GP1UX31RK
REMOTE CONTROL
SENSOR
KEY/OEL CONTROLLER
IC1841
PEG272A
X1841
16.000MHz
Q1811
Q1812
KEY MATRIX
S1803-S1809
OEL UNIT
CN1802
Q1881
Q1882
12V REGULATOR

3.2 OVERALL CONNECTION DIAGRAM(GUIDE PAGE)

Note: When ordering service parts, be sure to refer to " EXPLODED VIEWS AND PARTS LIST" or "ELECTRICAL PARTS LIST".







NOTE :
- Symbol indicates a resistor. No differentiation is made between chip resistors and discrete resistors.
- Symbol indicates a capacitor. No differentiation is made between chip capacitors and discrete capacitors.

For resistors and capacitors in the circuit diagrams, their resistance values or capacitance values are expressed in codes:

Ex. *Resistors

Code	Practical value
123	12k ohms
103	10k ohms

*Capacitors

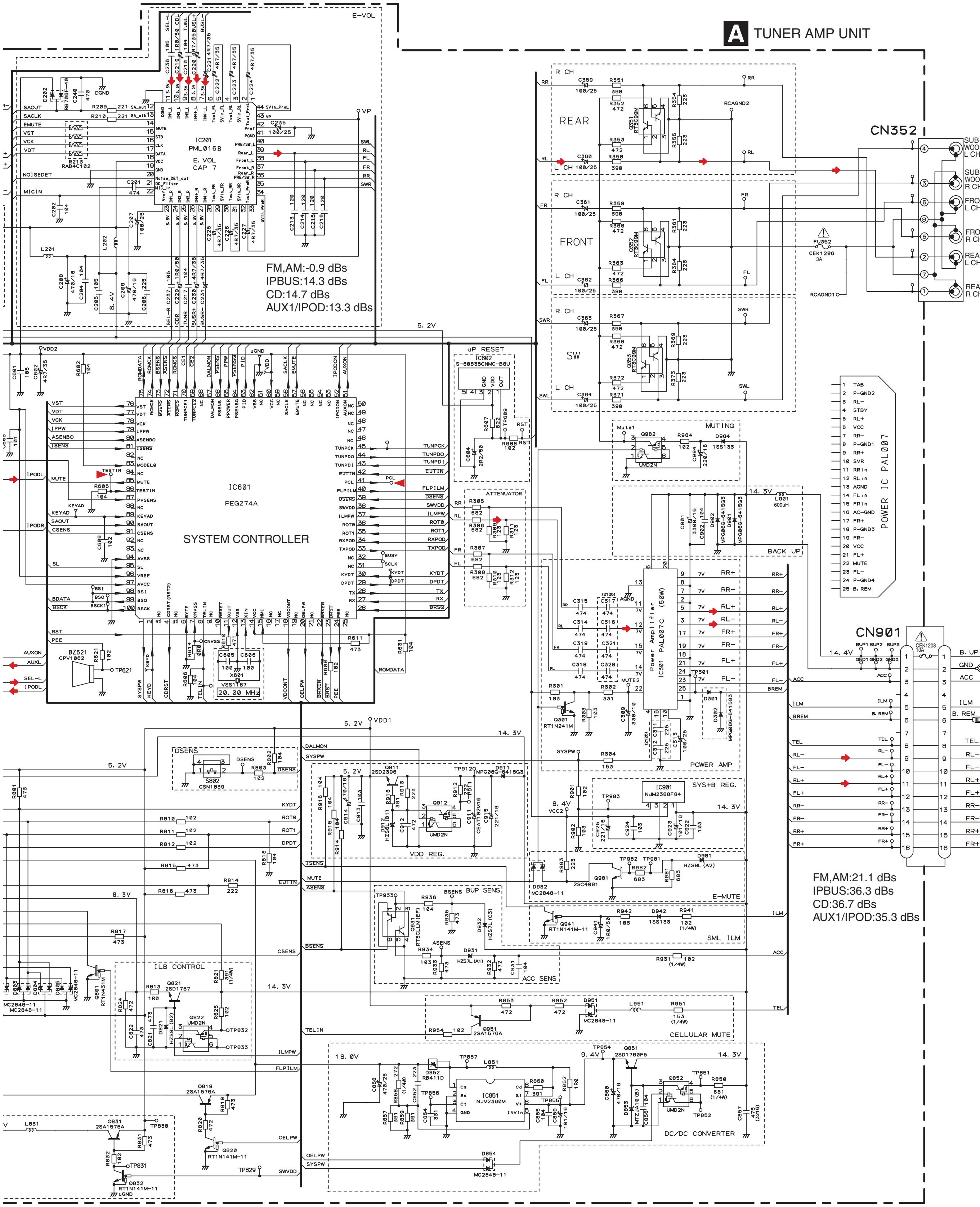
Code	Practical value
103	0.01uF
101/10	100uF/10V

SIDE A TEST POINT
SIDE B TEST POINT

The ⚠ mark found on some component parts indicates the importance of the safety factor of the part. Therefore, when replacing, be sure to use parts of identical designation.

A D

A-b


A TUNER AMP UNIT
E-VOL
IC201
PML016B
E. VOL
CAP 7
FM,AM:-0.9 dBs
IPBUS:14.3 dBs
CD:14.7 dBs
AUX1/IPOD:13.3 dBs
IC601
PEG274A
SYSTEM CONTROLLER
uP RESET
IC602
S-80835CNMC-B8U
ATTENUATOR
MUTING
BACK UP
REAR
FRONT
SW
CN352
SUB WOOFER L CH
SUB WOOFER R CH
FRONT L CH
FRONT R CH
REAR L CH
REAR R CH
POWER IC PAL007
Power Amplifier (50W)
IC301 PAL007C
POWER AMP
CN901
SYS+B REG.
IC901
NJM2388F84
VDD REG.
E-MUTE
BUP SENS
ACC SENS
SML ILM
ILB CONTROL
CELLULAR MUTE
DC/DC CONVERTER
IC851
NJM2360M
FM,AM:21.1 dBs
IPBUS:36.3 dBs
CD:36.7 dBs
AUX1/IPOD:35.3 dBs
B. UP
GND
ACC
ILM
B. REM
TEL
RL−
FL−
RL+
FL+
RR−
FR−
RR+
FR+

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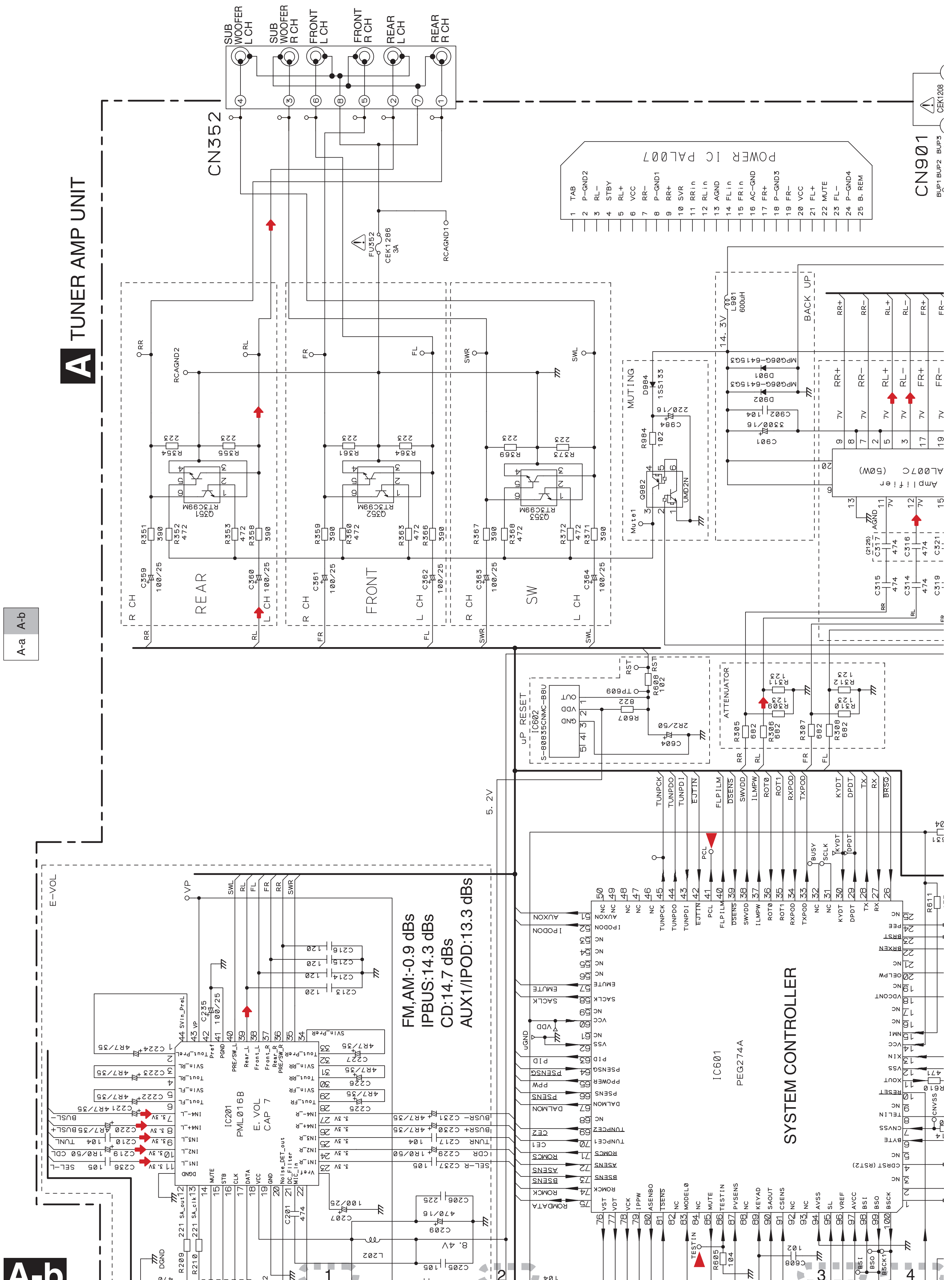
B

C

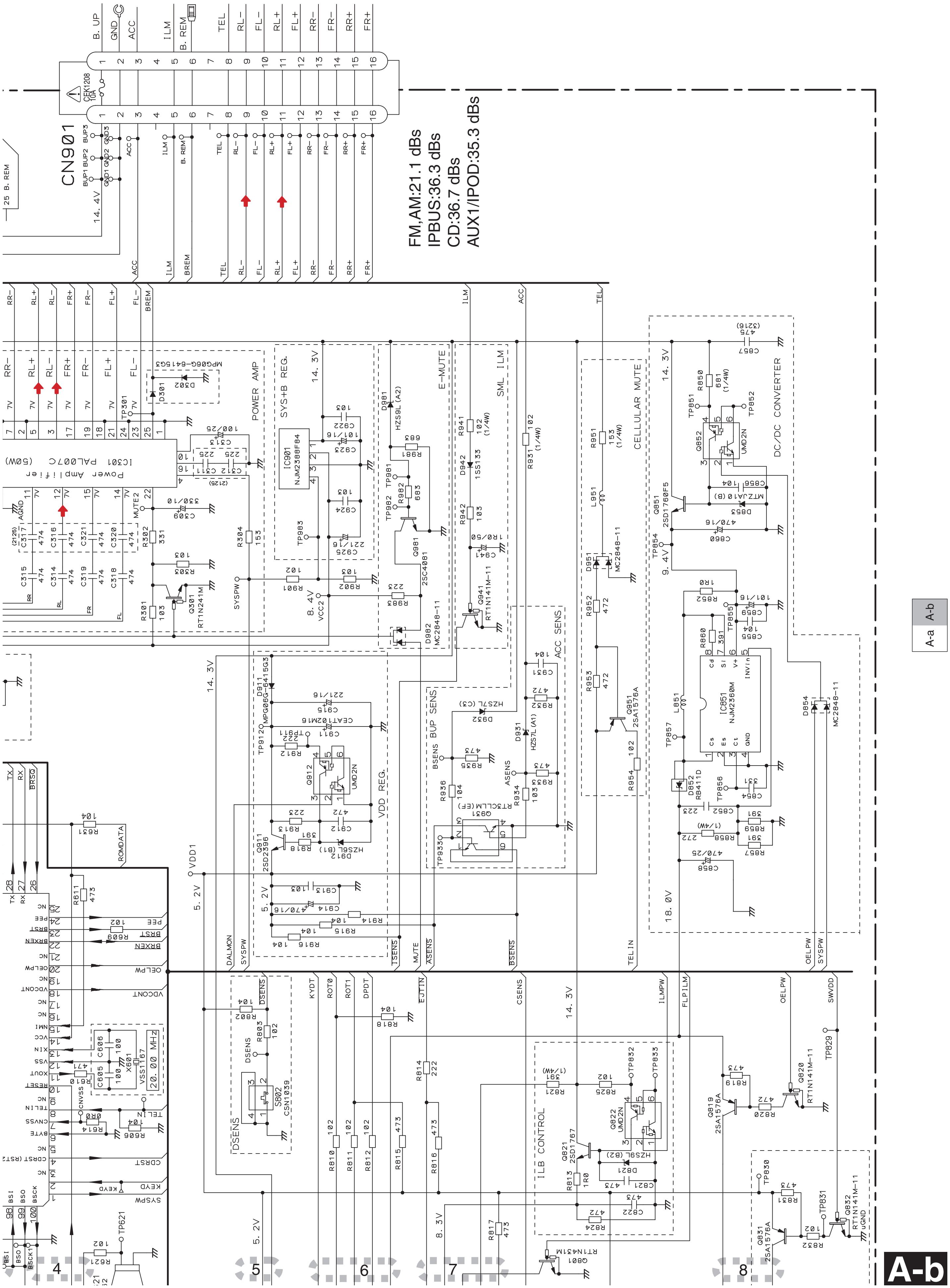
D

E

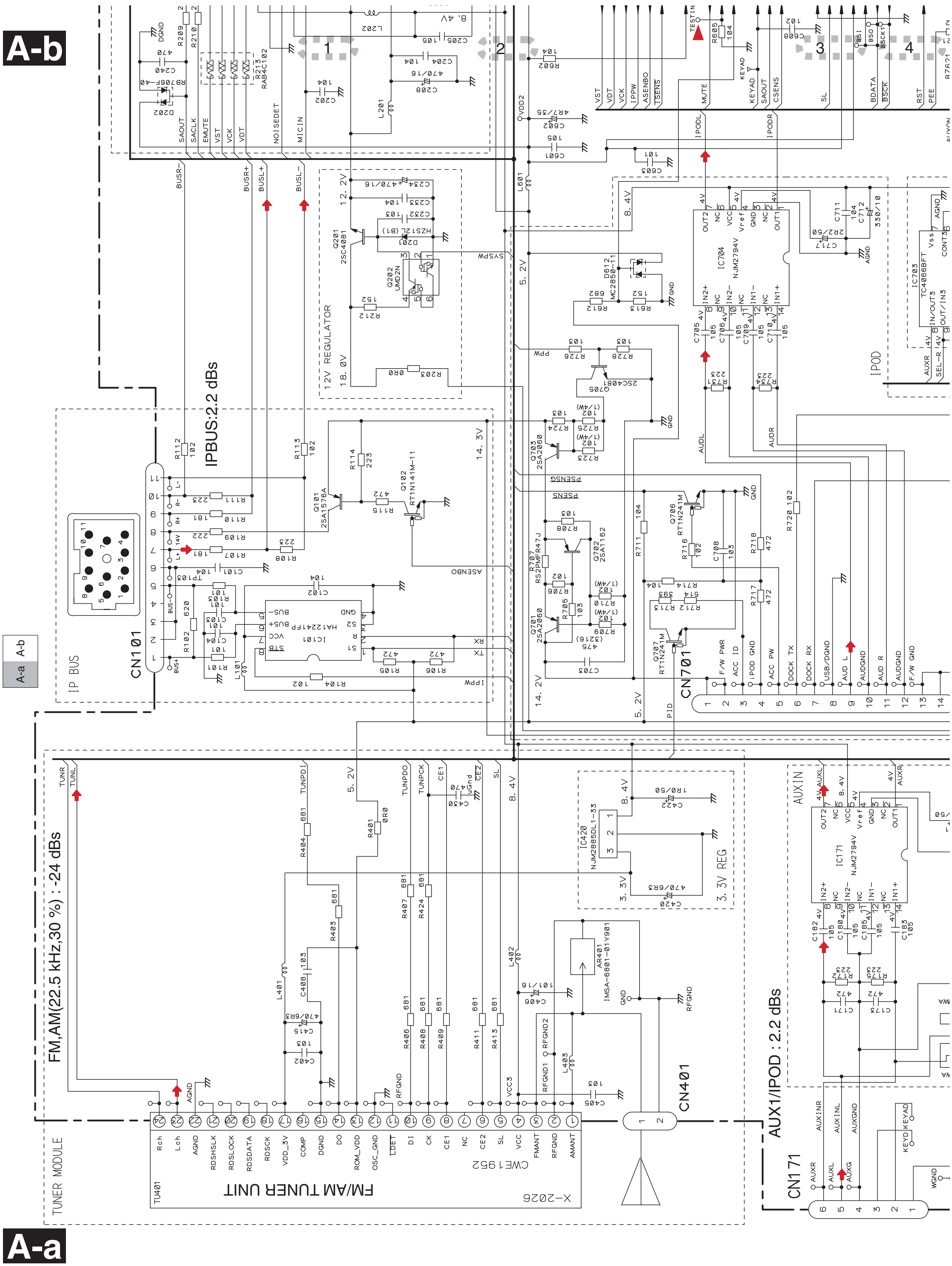
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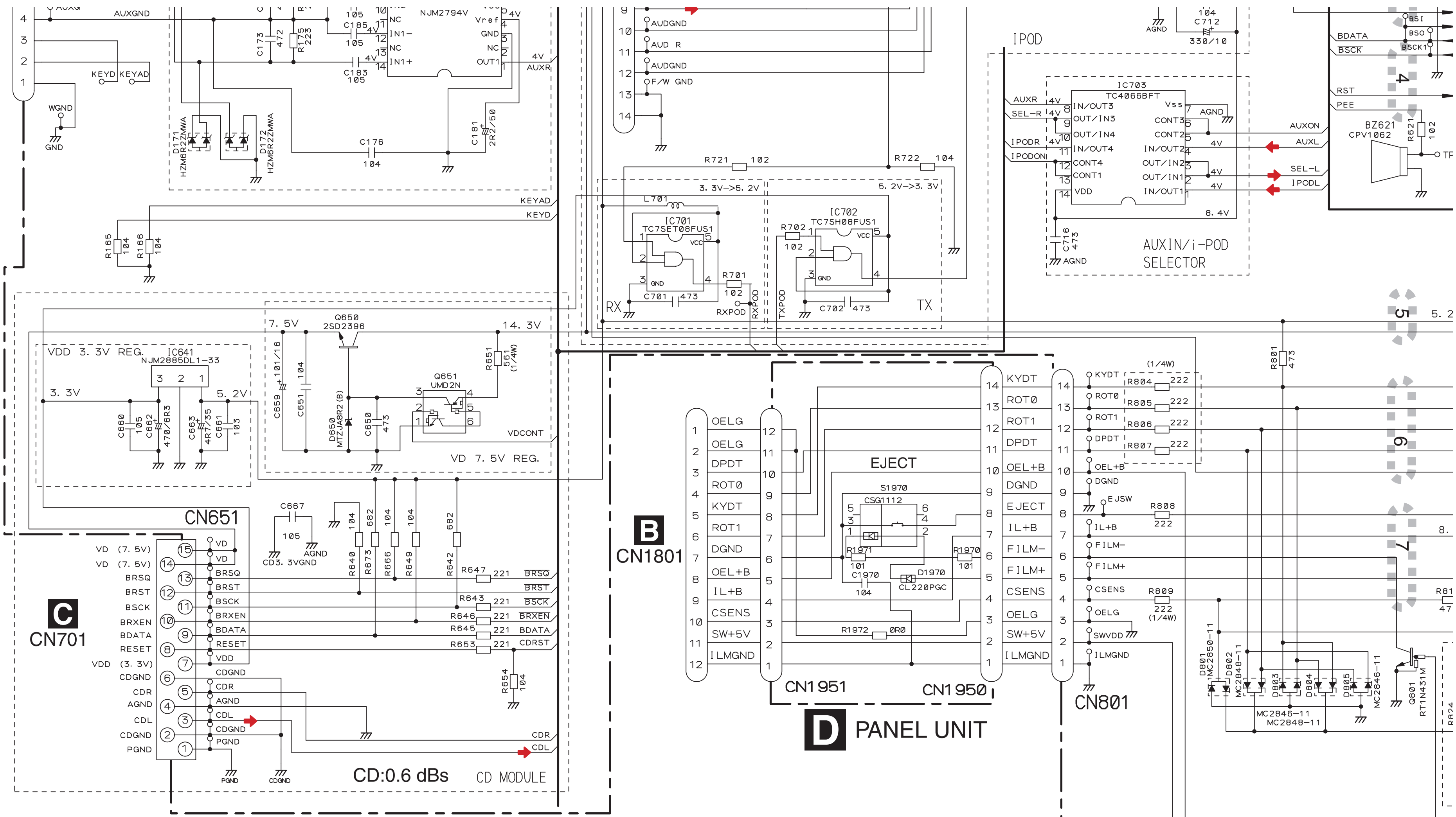
1 2 3 4


CN901
FM,AM:21.1 dBs
IPBUS:36.3 dBs
CD:36.7 dBs
AUX1/IPOD:35.3 dBs
POWER AMP
SYS+B REG.
E-MUTE
SML ILM
CELLULAR MUTE
DC/DC CONVERTER
ACC SENS
BUP SENS
VDD REG.
DSENS
ILB CONTROL
Power Amplifier
IC301 PAL007C (50W)
IC901 NJM2388F84
IC851 NJM2360M
A-a
A-b

A-b


IPBUS:2.2 dBs
FM,AM(22.5 kHz,30 %) : -24 dBs
AUX1/IPOD : 2.2 dBs
FM/AM TUNER UNIT
CWE1952
X-2026
TU401
TUNER MODULE
IP BUS
CN101
CN701
CN401
CN171
12V REGULATOR
3.3V REG
IPOD
AUXIN

A-a



NOTE :

- Symbol indicates a resistor. No differentiation is made between chip resistors and discrete resistors.
- Symbol indicates a capacitor. No differentiation is made between chip capacitors and discrete capacitors.

For resistors and capacitors in the circuit diagrams, their resistance values or capacitance values are expressed in codes:

Ex. *Resistors

Code	Practical value
123	12k ohms
103	10k ohms

*Capacitors

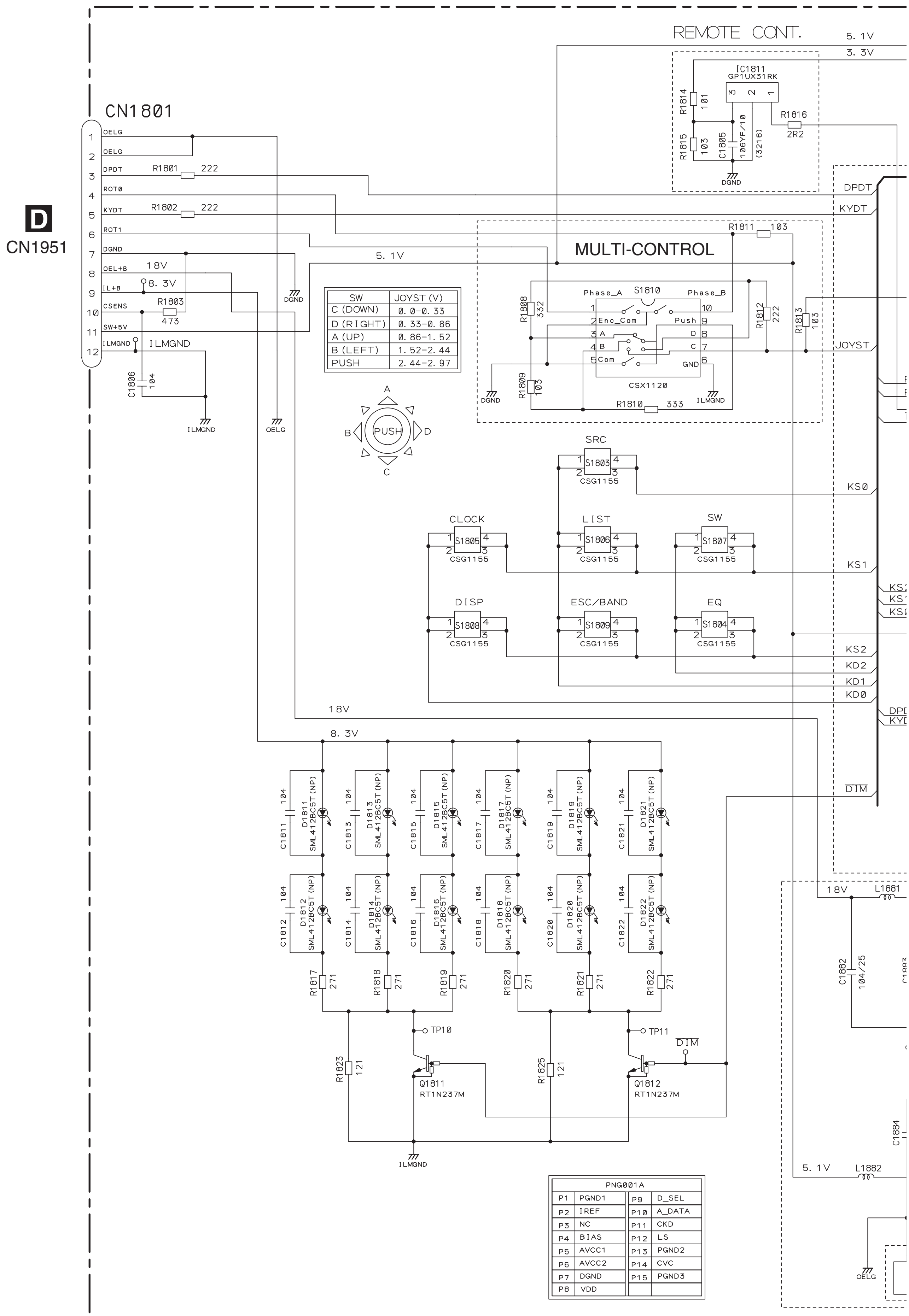
Code	Practical value
103	0.01uF
101/10	100uF/10V

SIDE A TEST POINT
SIDE B TEST POINT

The ⚠ mark found on some component parts indicates the importance of the safety factor of the part. Therefore, when replacing, be sure to use parts of identical designation.

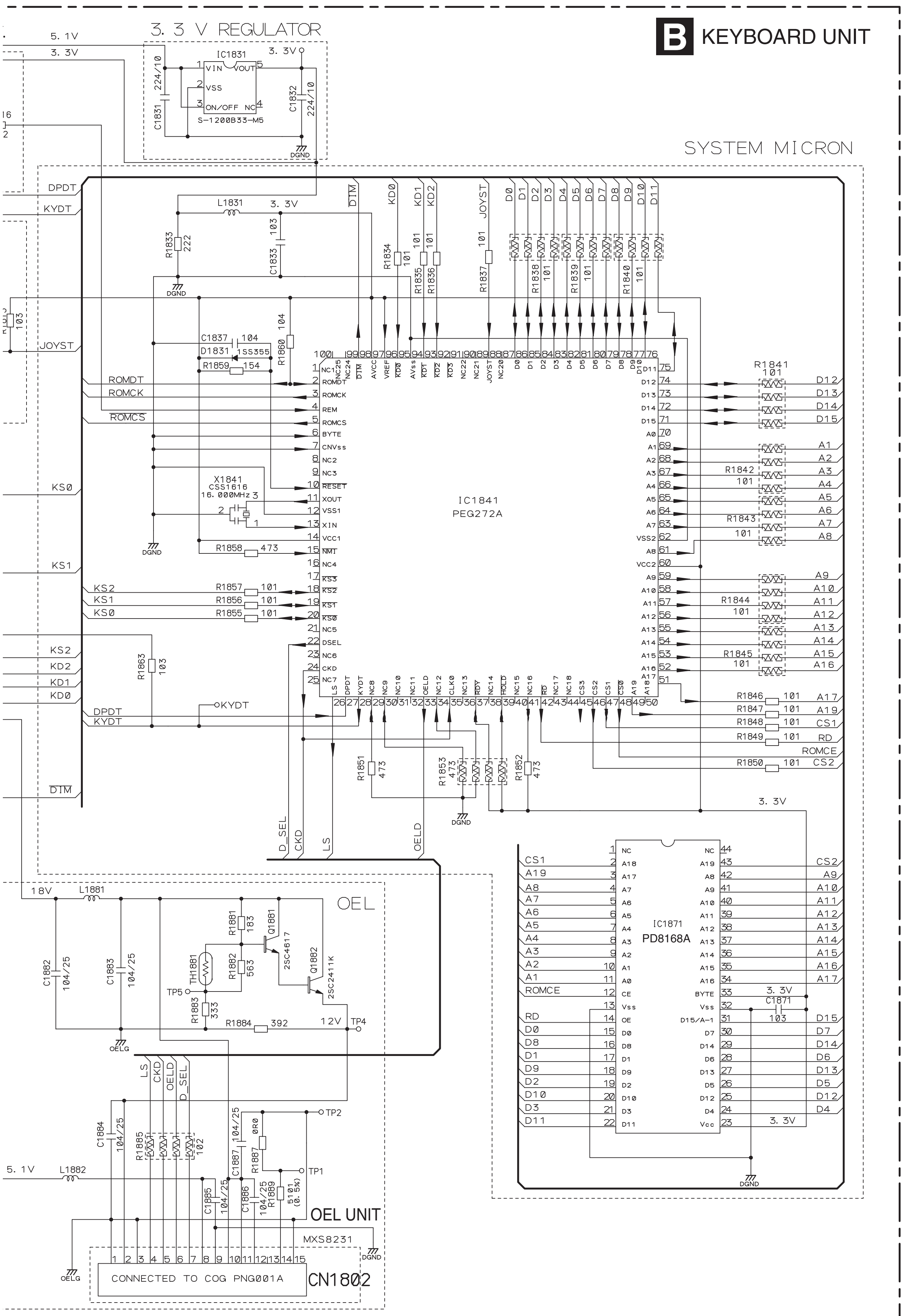
A-a A-b

3.3 KEYBOARD UNIT

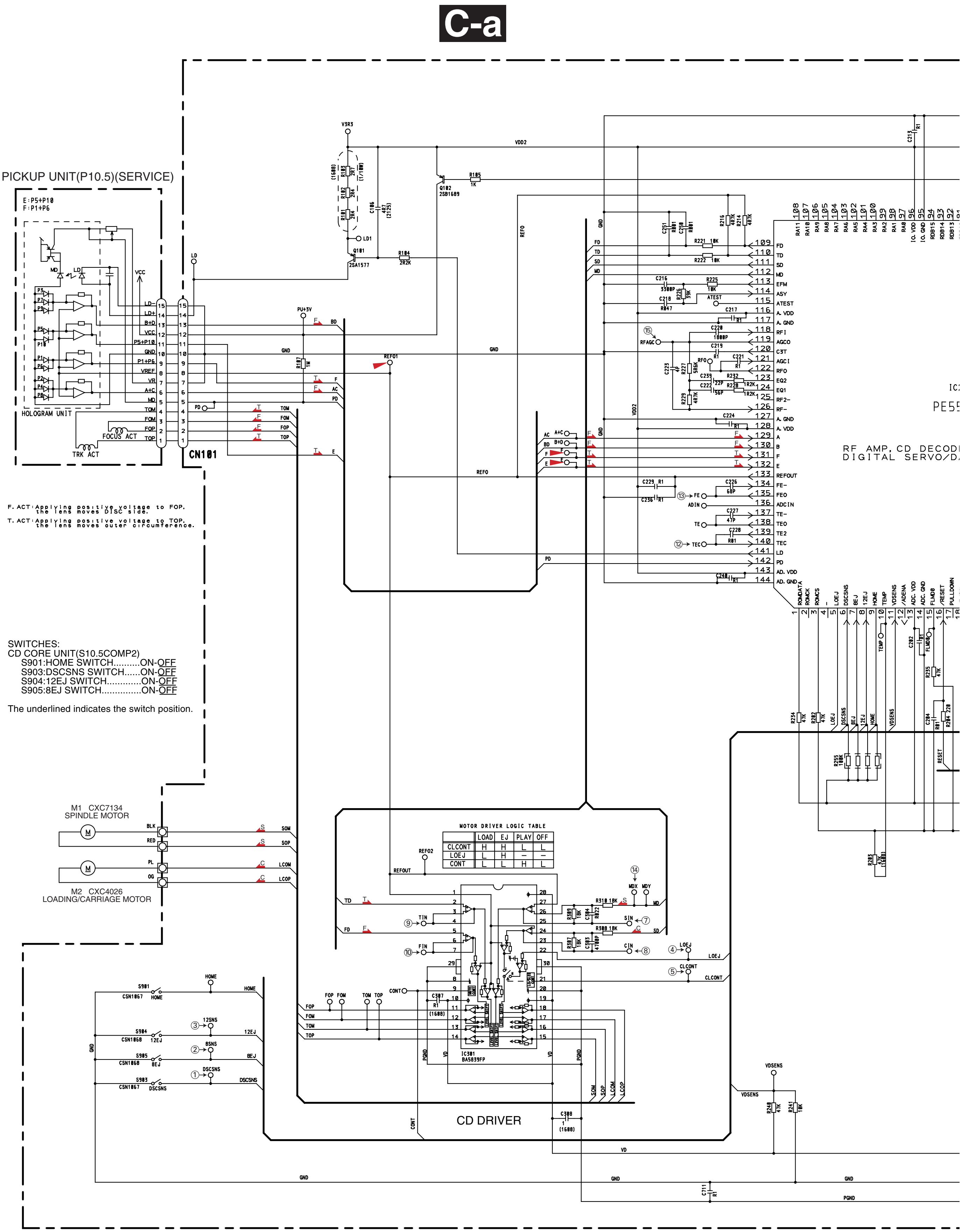


SW	JOYST (V)
C (DOWN)	0.0-0.33
D (RIGHT)	0.33-0.86
A (UP)	0.86-1.52
B (LEFT)	1.52-2.44
PUSH	2.44-2.97

PNG001A			
P1	PGND1	P9	D_SEL
P2	IREF	P10	A_DATA
P3	NC	P11	CKD
P4	BIAS	P12	LS
P5	AVCC1	P13	PGND2
P6	AVCC2	P14	CVC
P7	DGND	P15	PGND3
P8	VDD		


B KEYBOARD UNIT
3.3 V REGULATOR
IC1831
S-1200B33-M5
VIN VOUT
VSS
ON/OFF NC
C1831 224/10
C1832 224/10
5.1V
3.3V
DGND
SYSTEM MICRON
IC1841
PEG272A
X1841
CSS1616
16.000MHz
L1831
R1833 222
C1833 103
C1837 104
D1831 1SS355
R1859 154
R1860 104
R1834 101
R1835 101
R1836 101
R1837 101
R1838 101
R1839 101
R1840 101
R1841 101
R1842 101
R1843 101
R1844 101
R1845 101
R1846 101
R1847 101
R1848 101
R1849 101
R1850 101
R1851 473
R1852 473
R1853 473
R1855 101
R1856 101
R1857 101
R1858 473
R1863 103
DPDT
KYDT
JOYST
ROMDT
ROMCK
ROMCS
KS0
KS1
KS2
KD0
KD1
KD2
DIM
D_SEL
CKD
LS
OELD
ROMCE
CS1
CS2
RD
IC1871
PD8168A
C1871 103
OEL
L1881
18V
C1882 104/25
C1883 104/25
TH1881
R1881 183
R1882 563
R1883 333
R1884 392
Q1881 2SC4617
Q1882 2SC2411K
TP5
TP4
12V
OELG
L1882
C1884 104/25
R1885 102
C1885 104/25
C1886 104/25
C1887 104/25
R1887 0R0
R1889 5101 (0.5%)
TP1
TP2
OEL UNIT
MXS8231
CONNECTED TO COG PNG001A
CN1802

3.4 CD MECHANISM MODULE(GUIDE PAGE)



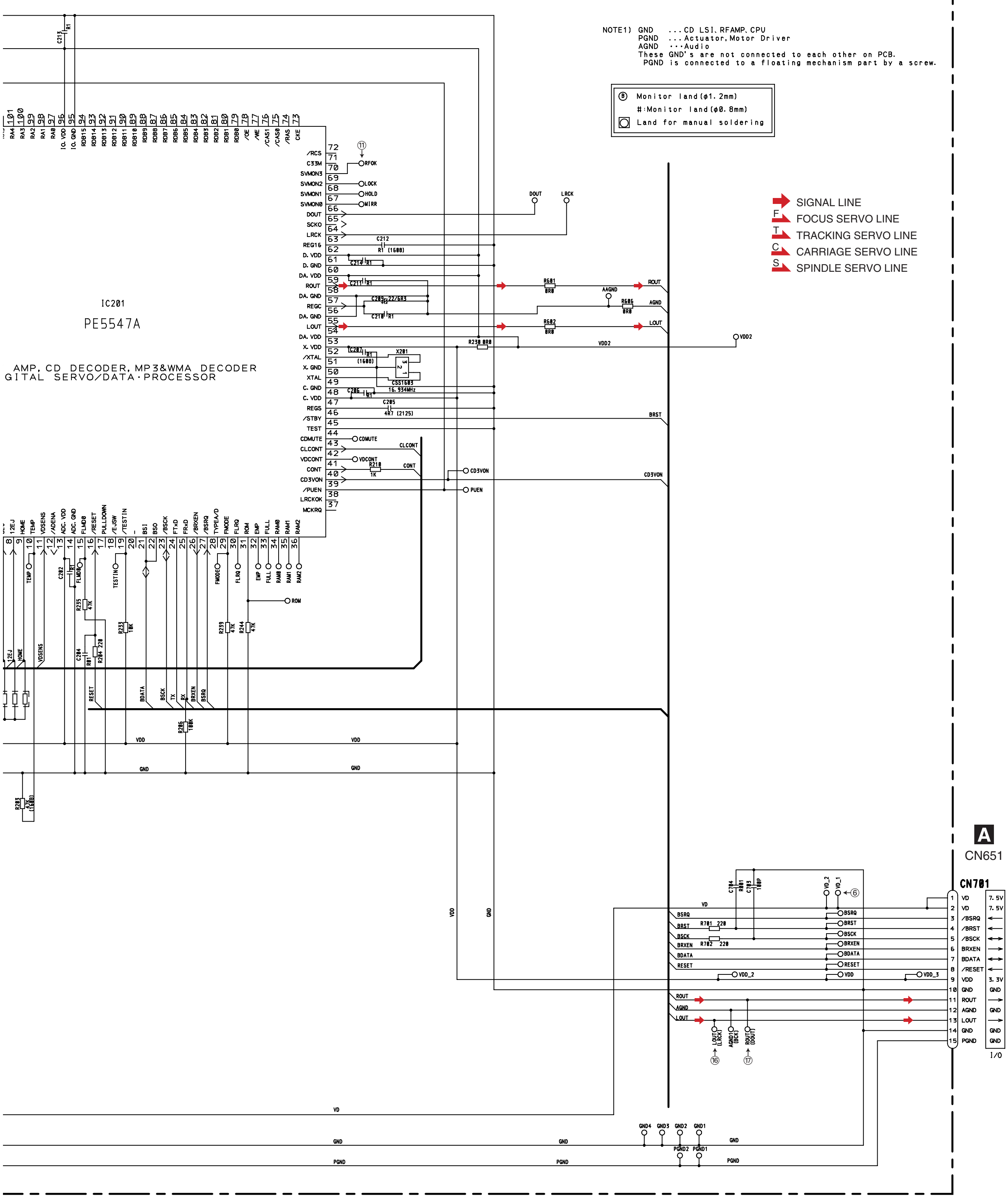
MOTOR DRIVER LOGIC TABLE

	LOAD	EJ	PLAY	OFF
CLCONT	H	H	L	L
LOEJ	L	H	–	–
CONT	L	L	H	L

C

C-b

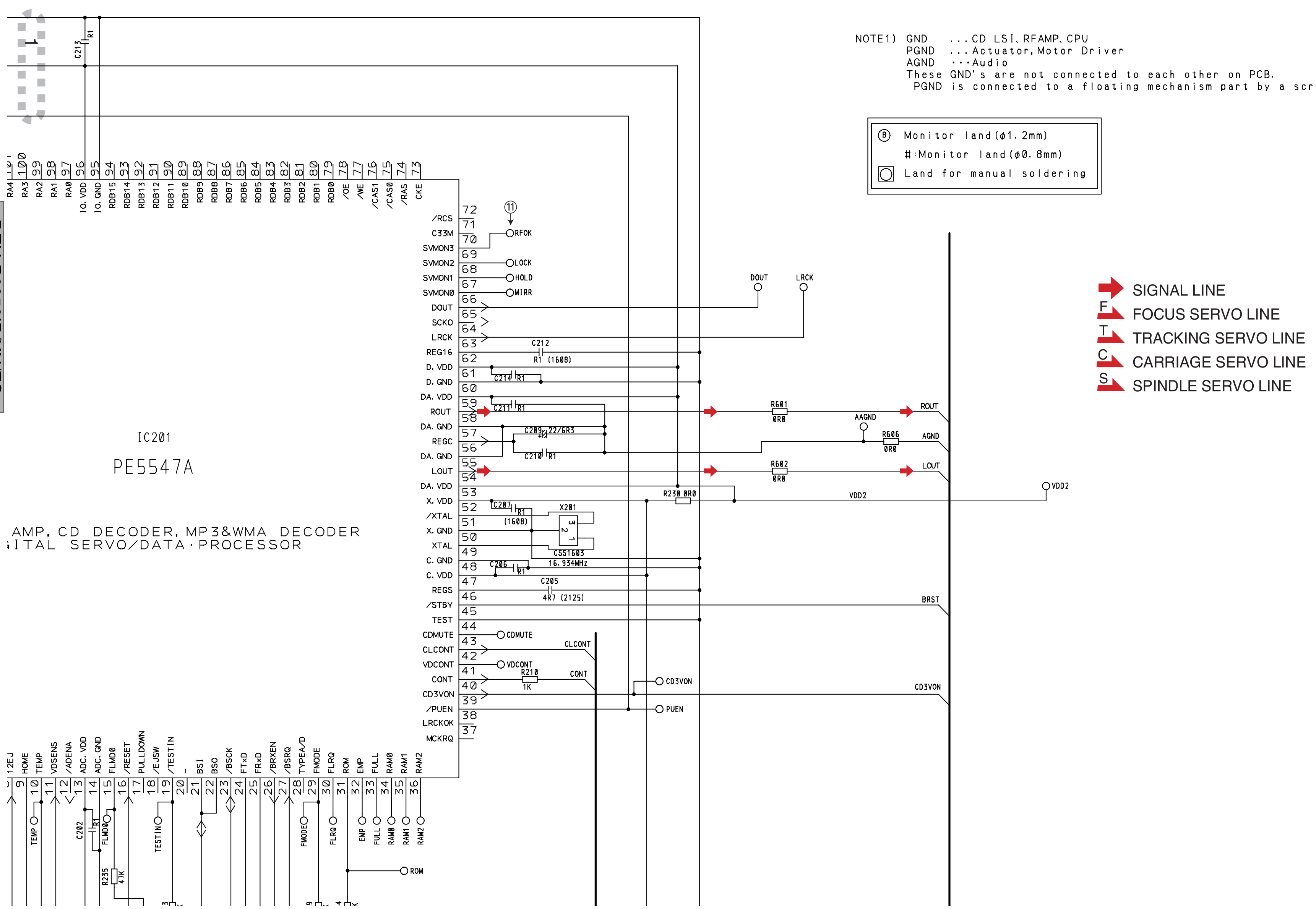
C CD CORE UNIT(S10.5COMP2)



C CD CORE UNIT(S10.5COMP2)

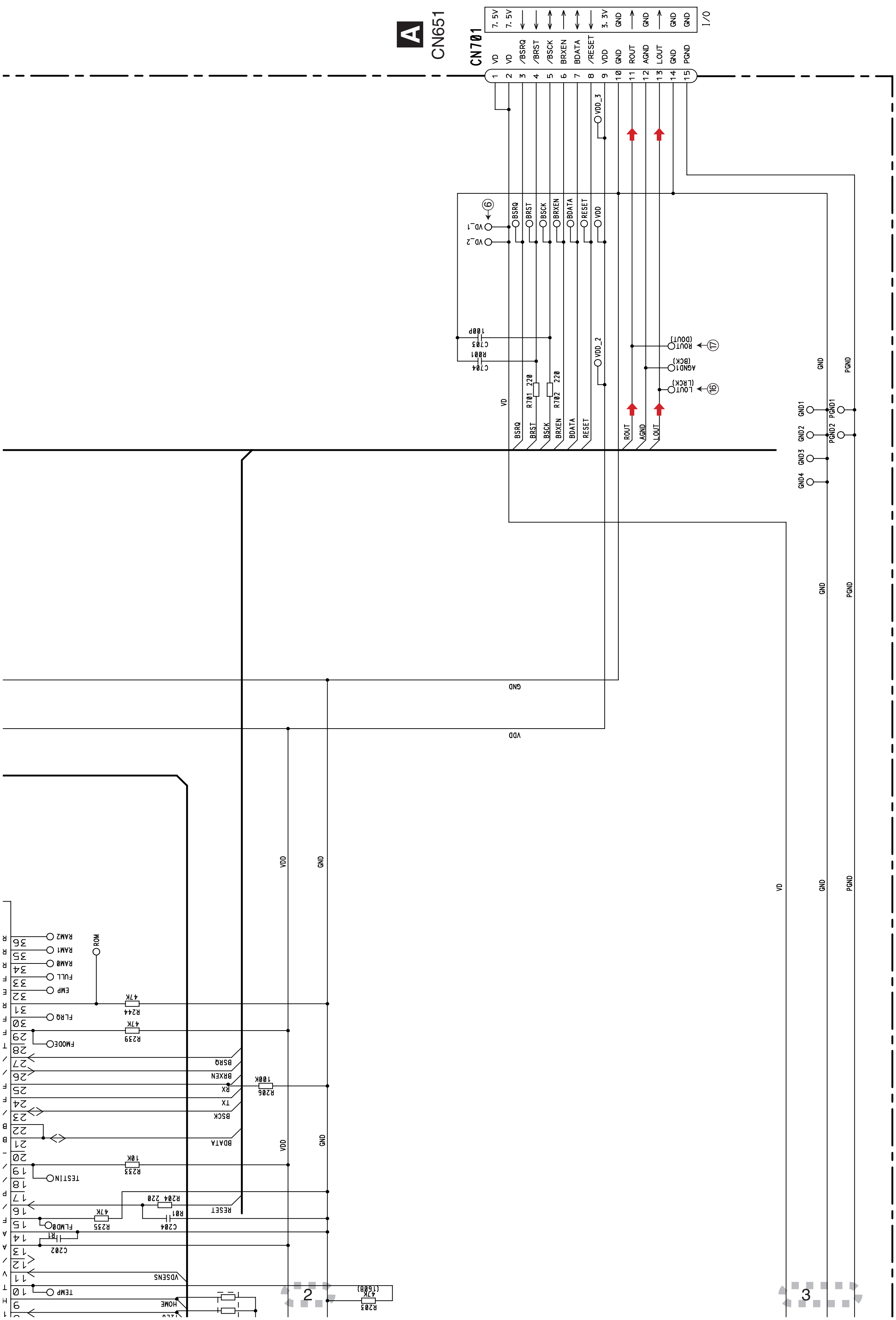
NOTE1) GND ...CD LSI, RFAMP, CPU
PGND ...Actuator, Motor Driver
AGND ...Audio
These GND's are not connected to each other on PCB.
PGND is connected to a floating mechanism part by a screw.

Ⓑ Monitor land(ϕ1.2mm)
#:Monitor land(ϕ0.8mm)
◯ Land for manual soldering



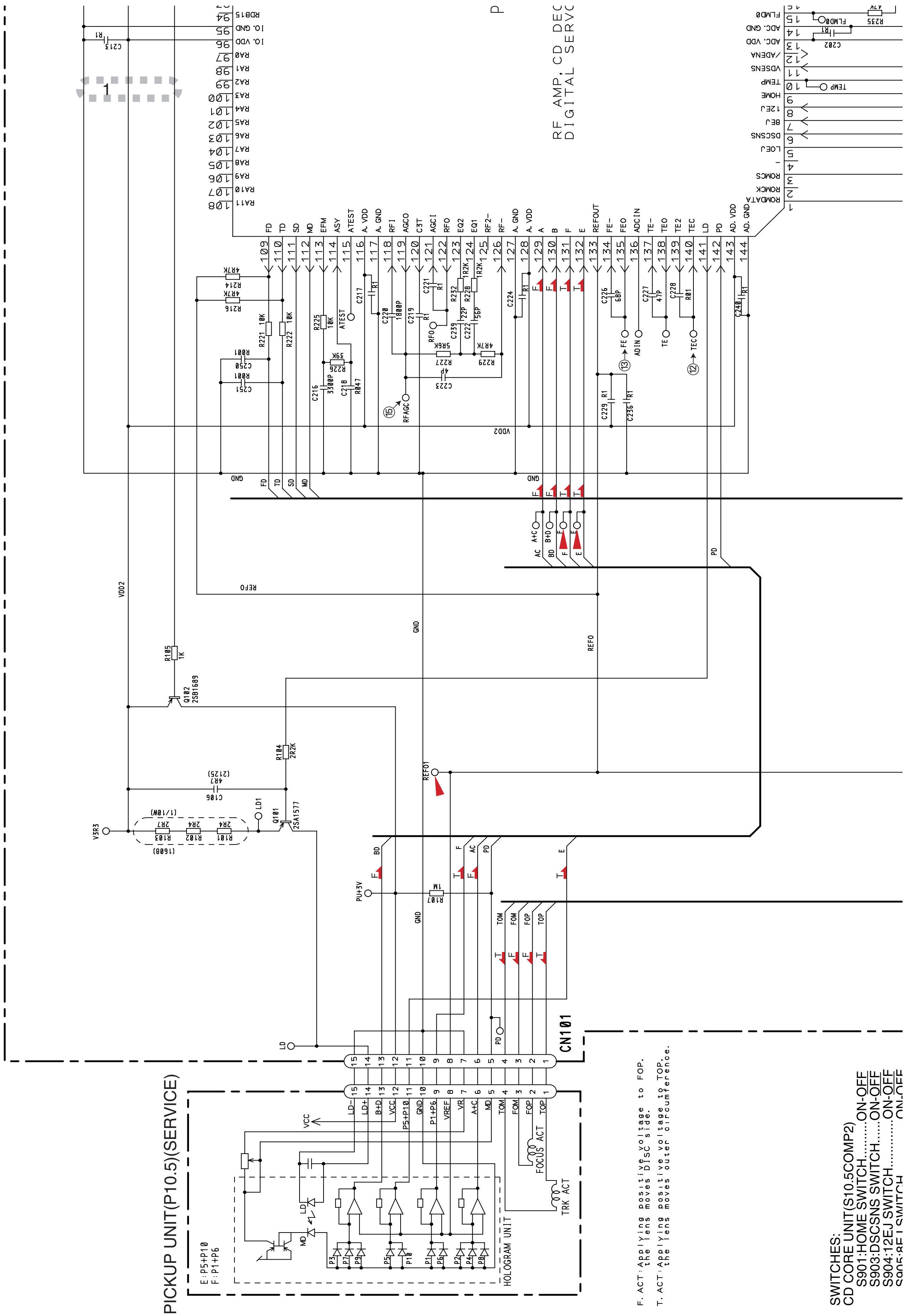
5 6 7 8

A B C D E F

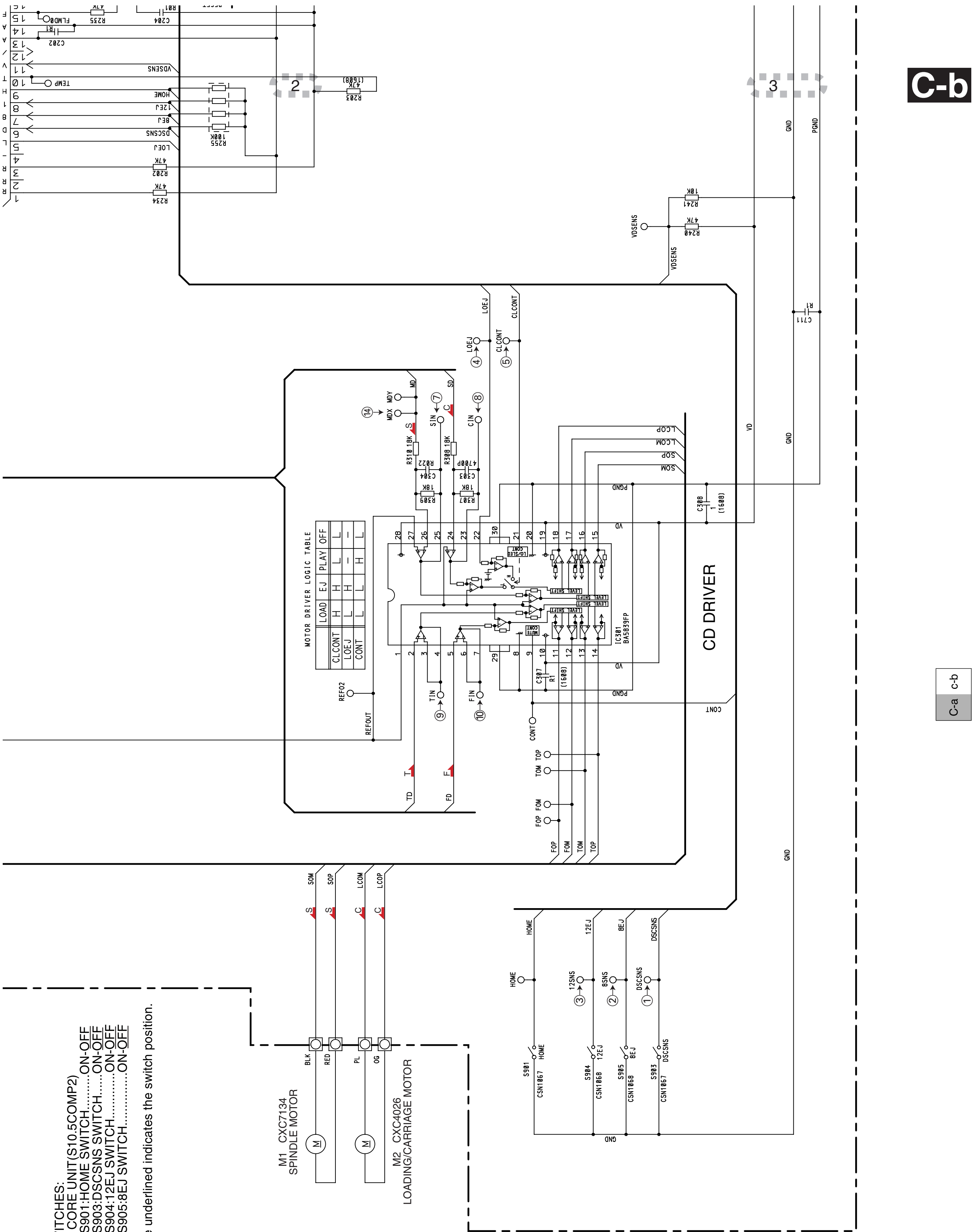


C-a C-b

C-b


RF AMP, CD DEC
DIGITAL SERVO
PICKUP UNIT(P10.5)(SERVICE)
HOLOGRAM UNIT
FOCUS ACT
TRK ACT
CN101
E:P5+P10
F:P1+P6
F. ACT: Applying positive voltage to FOP. the lens moves DISC side.
T. ACT: Applying positive voltage to TOP. the lens moves outer circumference.
SWITCHES:
CD CORE UNIT(S10.5COMP2)
S901:HOME SWITCH.........ON-OFF
S903:DSCSNS SWITCH.......ON-OFF
S904:12EJ SWITCH.........ON-OFF

C-a



SWITCHES:
CD CORE UNIT(S10.5COMP2)
S901:HOME SWITCH.........ON-OFF
S903:DSCSNS SWITCH......ON-OFF
S904:12EJ SWITCH............ON-OFF
S905:8EJ SWITCH..............ON-OFF
The underlined indicates the switch position.

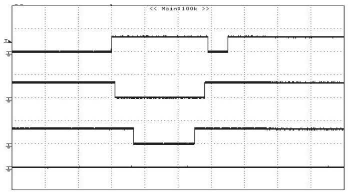
● Waveforms

Note : 1. The encircled numbers denote measuring points in the circuit diagram.
2. Reference voltage REFO1(1.65 V)

①DSCSNS 5 V/div 500 ms/div
②8SNS 5 V/div
③12SNS 5 V/div
④LOEJ 5 V/div

12 cm CD Loading operation

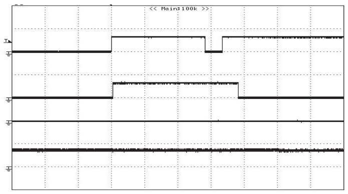
Ref.: GND
Mode: Normal



①DSCSNS 5 V/div 500 ms/div
⑤CLCONT 5 V/div
④LOEJ 5 V/div
⑥VD 10 V/div

12 cm CD Loading operation

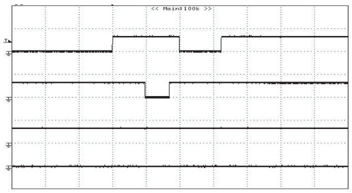
Ref.: GND
Mode: Normal



①DSCSNS 5 V/div 500 ms/div
②8SNS 5 V/div
③12SNS 5 V/div
④LOEJ 5 V/div

8 cm CD Loading operation

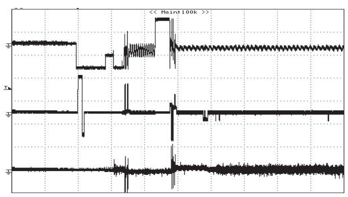
Ref.: GND
Mode: Normal



⑦SIN 1 V/div 1 s/div
⑧CIN 500 mV/div
⑨TIN 1 V/div

12 cm CD-DA setup operation after loading

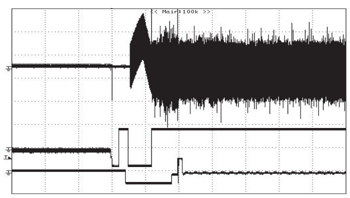
Ref.: REFO
Mode: Normal



⑩FIN 200 mV/div 500 ms/div
⑪RFOK(MONI_2) 2 V/div
⑦SIN 2 V/div

12 cm CD-DA Source On setup operation

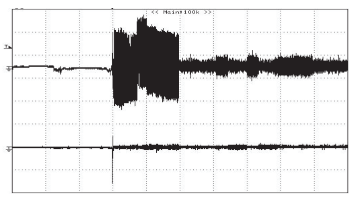
Ref.: REFO
Mode: Normal



⑫TE 500 mV/div 200 ms/div
⑬FE 500 mV/div

Source On setup operation

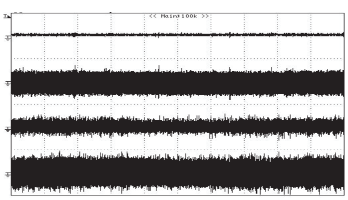
Ref.: REFO
Mode: Normal



⑬FE 500 mV/div 20 ms/div
⑩FIN 500 mV/div
⑫TE 500 mV/div
⑨TIN 500 mV/div

CD-DA Play operation

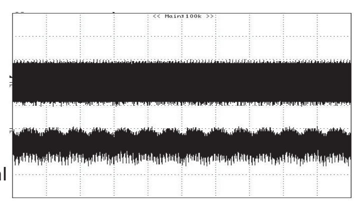
Ref.: REFO
Mode: Normal



⑭MDX 2 V/div 200 ms/div
⑦SIN 500 mV/div

Spindle waveform during play operation

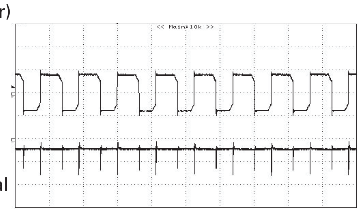
Ref.: REFO
Mode: Normal



⑭MDX 2 V/div 5 µs/div
⑦SIN 500 mV/div

Spindle waveform during play operation (Wider)

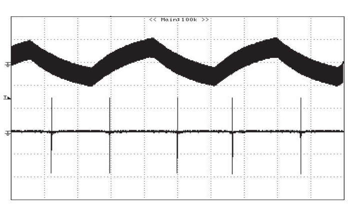
Ref.: REFO
Mode: Normal



⑩FIN 500 mV/div 200 ms/div
⑬FE 500 mV/div

Focus Search waveform

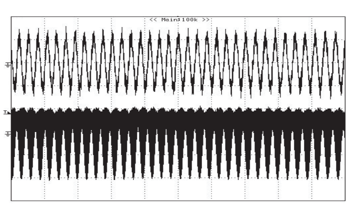
Ref.: REFO
Mode: TEST



⑫TE 500 mV/div 2 ms/div
⑮RFAGC 500 mV/div

Track Open waveform

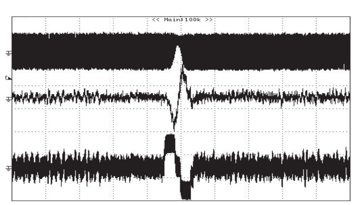
Ref.: REFO
Mode: TEST



⑮RFAGC 1 V/div 500 µs/div
⑫TE 500 mV/div
⑨TIN 500 mV/div

1 Track Jump waveform

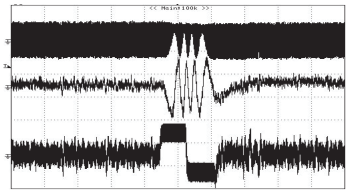
Ref.: REFO
Mode: TEST



⑮RFAGC 1 V/div 500 µs/div
⑫TE 500 mV/div
⑨TIN 500 mV/div

4 Tracks Jump waveform

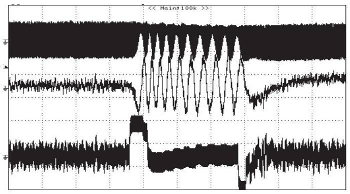
Ref.: REFO
Mode: TEST



⑮RFAGC 1 V/div 500 µs/div
⑫TE 500 mV/div
⑨TIN 500 mV/div

10 Tracks Jump waveform

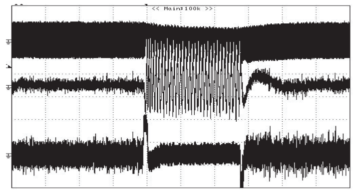
Ref.: REFO
Mode: TEST



⑮RFAGC 1 V/div 2 ms/div
⑫TE 500 mV/div
⑨TIN 500 mV/div

32 Tracks Jump waveform

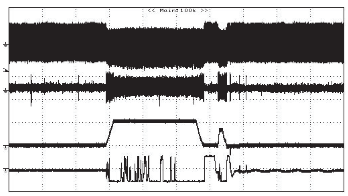
Ref.: REFO
Mode: TEST



⑮RFAGC 1 V/div 200 ms/div
⑫TE 1 V/div
⑧CIN 1 V/div
⑦SIN 2 V/div

Search operation(Outter to Inner)

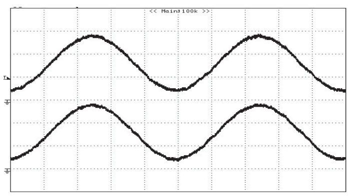
Ref.: REFO
Mode: Normal



⑯LOUT 1 V/div 200 µs/div
⑰ROUT 1 V/div

Analog audio waveform

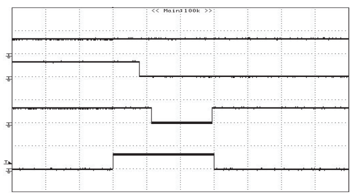
Ref.: AGND
Mode: Normal



①DSCSNS 5 V/div 500 ms/div
②8SNS 5 V/div
③12SNS 5 V/div
④LOEJ 5 V/div

12 cm CD Eject operation

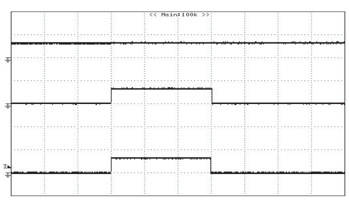
Ref.: GND
Mode: Normal



①DSCSNS 5 V/div 500 ms/div
⑤CLCONT 5 V/div
④LOEJ 5 V/div

12 cm CD Eject operation

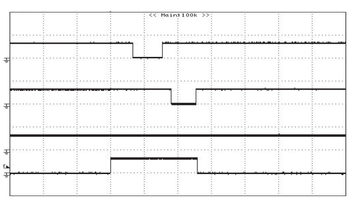
Ref.: GND
Mode: Normal



①DSCSNS 5 V/div 500 ms/div
②8SNS 5 V/div
③12SNS 5 V/div
④LOEJ 5 V/div

8 cm CD Eject operation

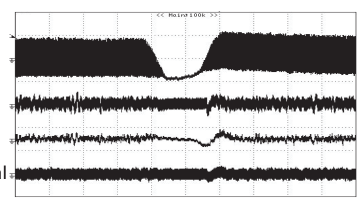
Ref.: GND
Mode: Normal



⑮RFAGC 1 V/div 500 µs/div
⑨TIN 1 V/div
⑫TE 1 V/div
⑩FIN 1 V/div

Black dot(800 µm) during play

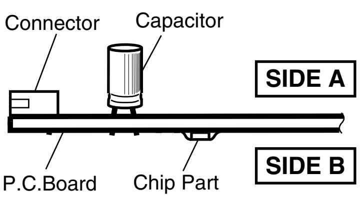
Ref.: REFO
Mode: Normal



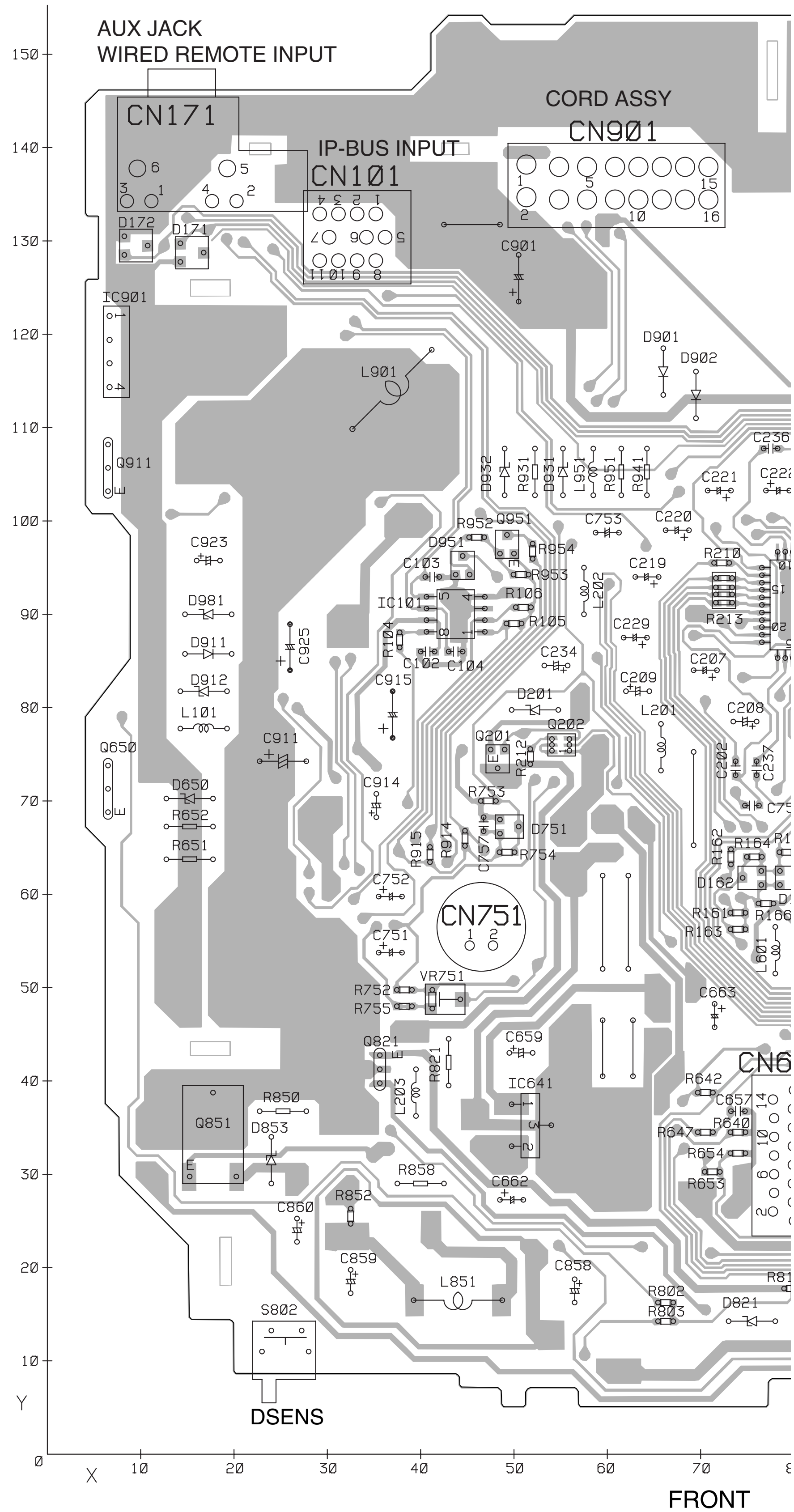
4. PCB CONNECTION DIAGRAM
4.1 TUNER AMP UNIT

NOTE FOR PCB DIAGRAMS

1. The parts mounted on this PCB include all necessary parts for several destination.
   For further information for respective destinations, be sure to check with the schematic diagram.
2. Viewpoint of PCB diagrams

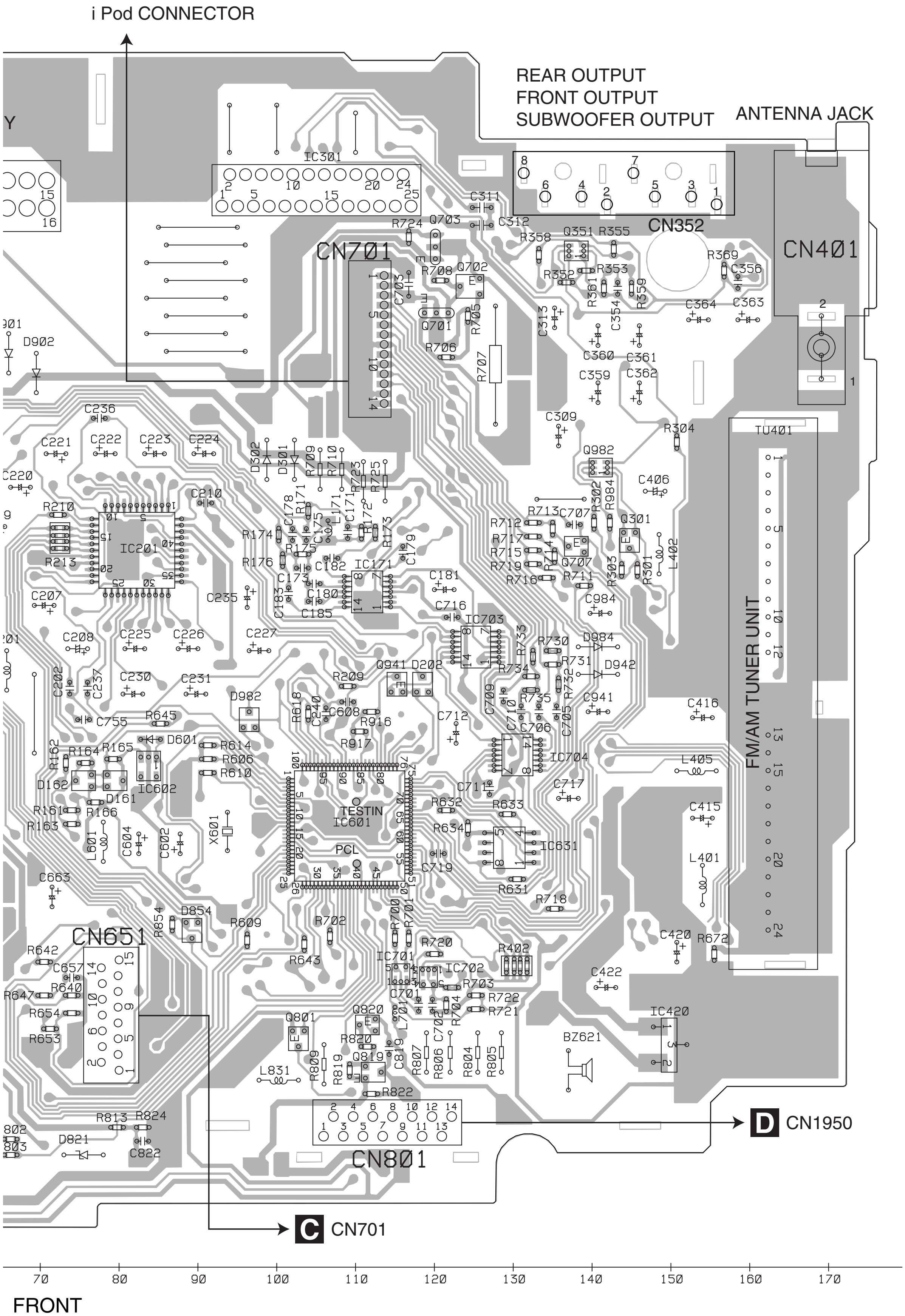


A TUNER AMP UNIT



A

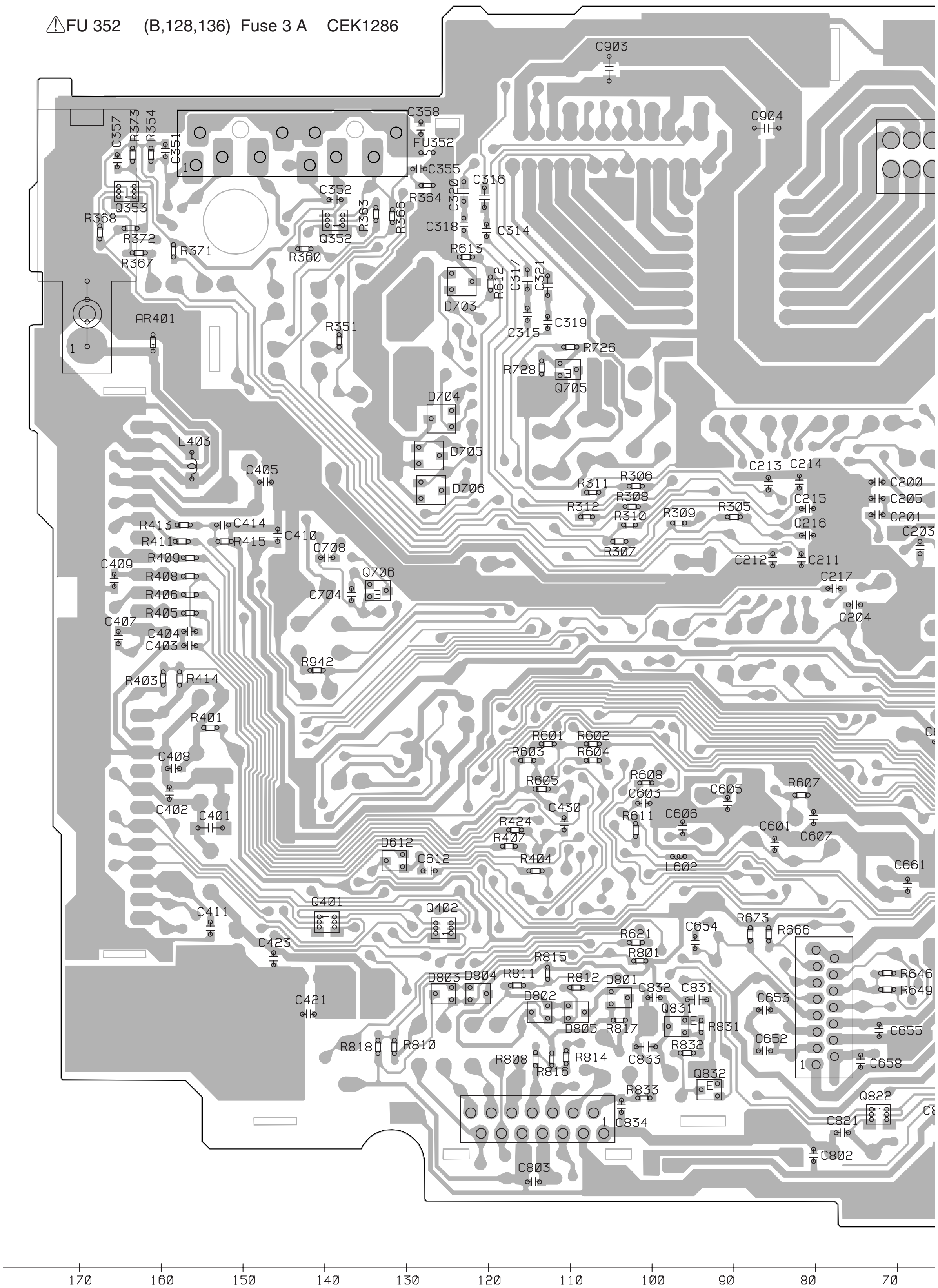
SIDE A


i Pod CONNECTOR
REAR OUTPUT
FRONT OUTPUT
SUBWOOFER OUTPUT
ANTENNA JACK
IC301
CN352
CN401
CN701
TU401
FM/AM TUNER UNIT
IC201
IC171
IC703
IC704
IC601
TESTIN
PCL
IC602
IC631
IC701
IC702
IC420
BZ621
CN651
CN801
D CN1950
C CN701
FRONT
70 80 90 100 110 120 130 140 150 160 170

A

A TUNER AMP UNIT

⚠FU 352 (B,128,136) Fuse 3 A CEK1286



A

SIDE B

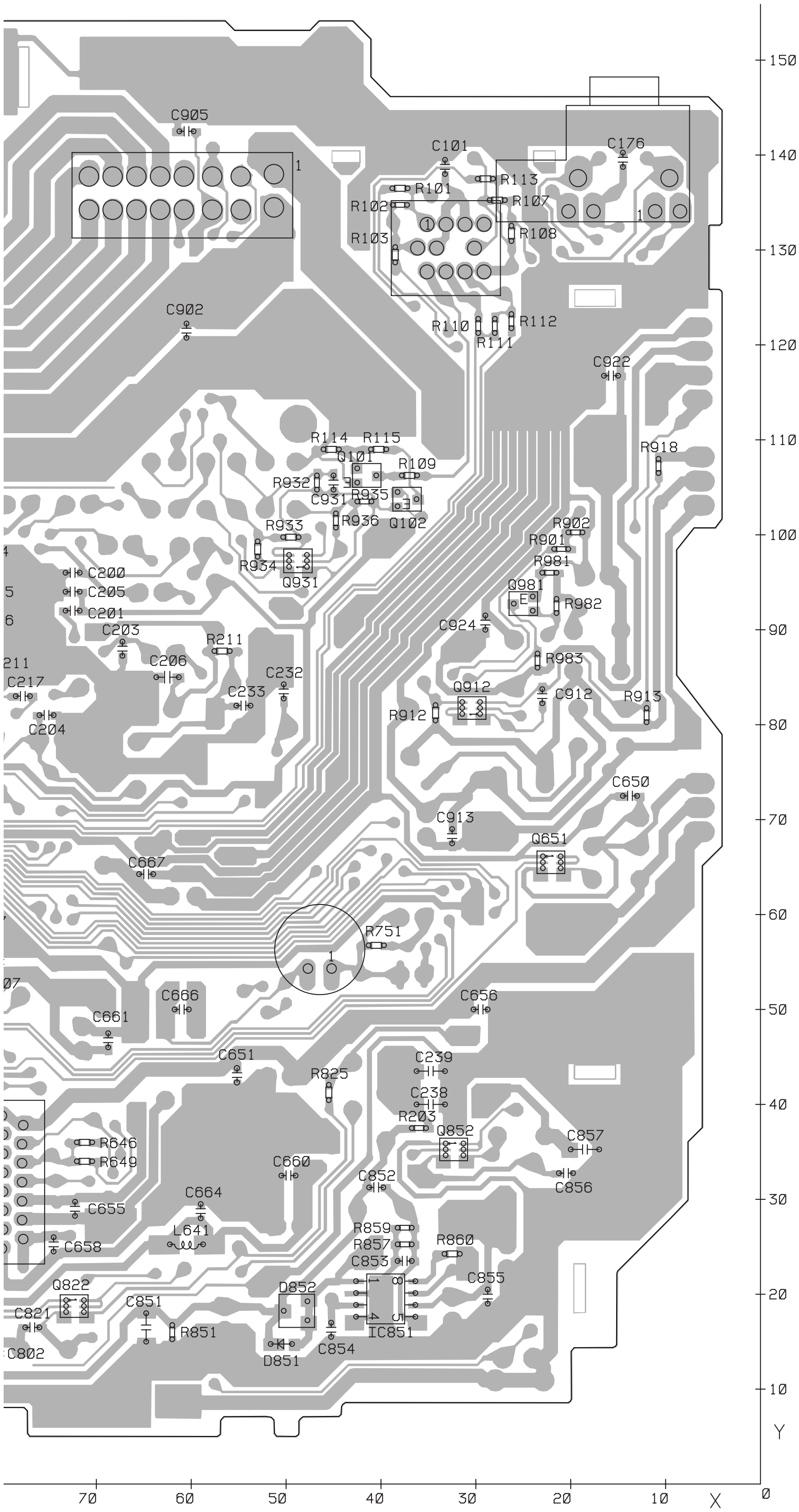
B

C

D

E

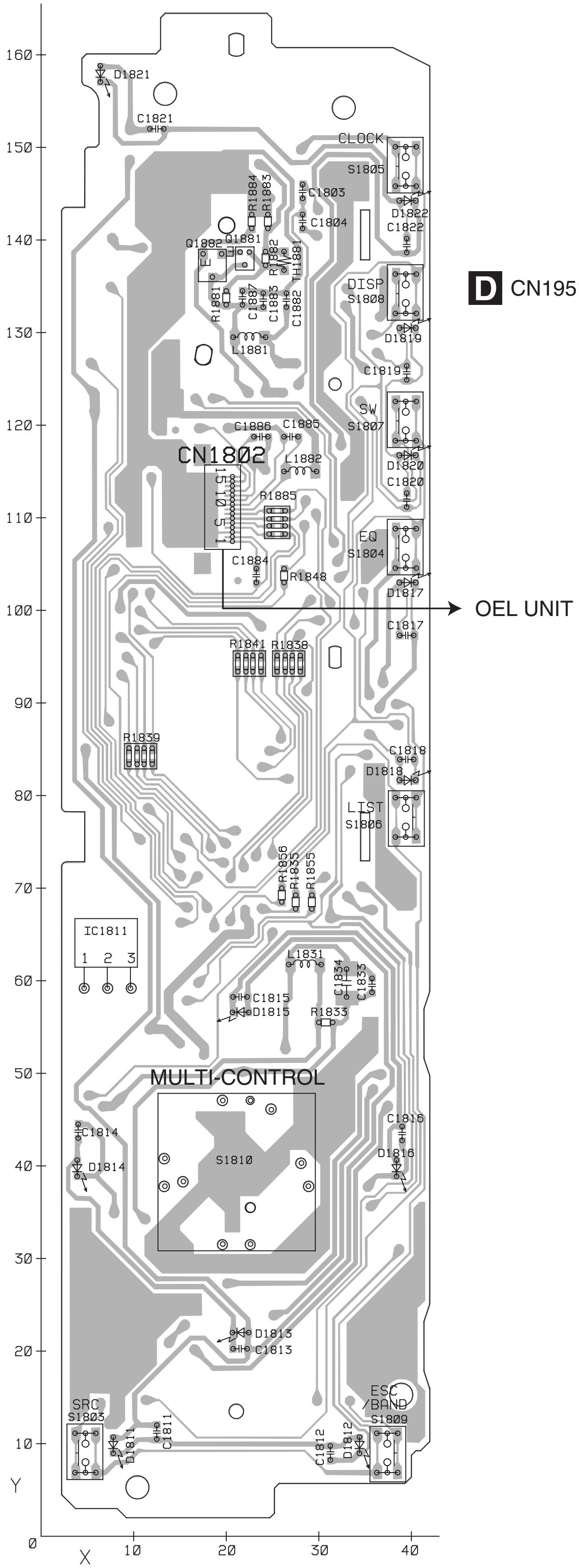
F



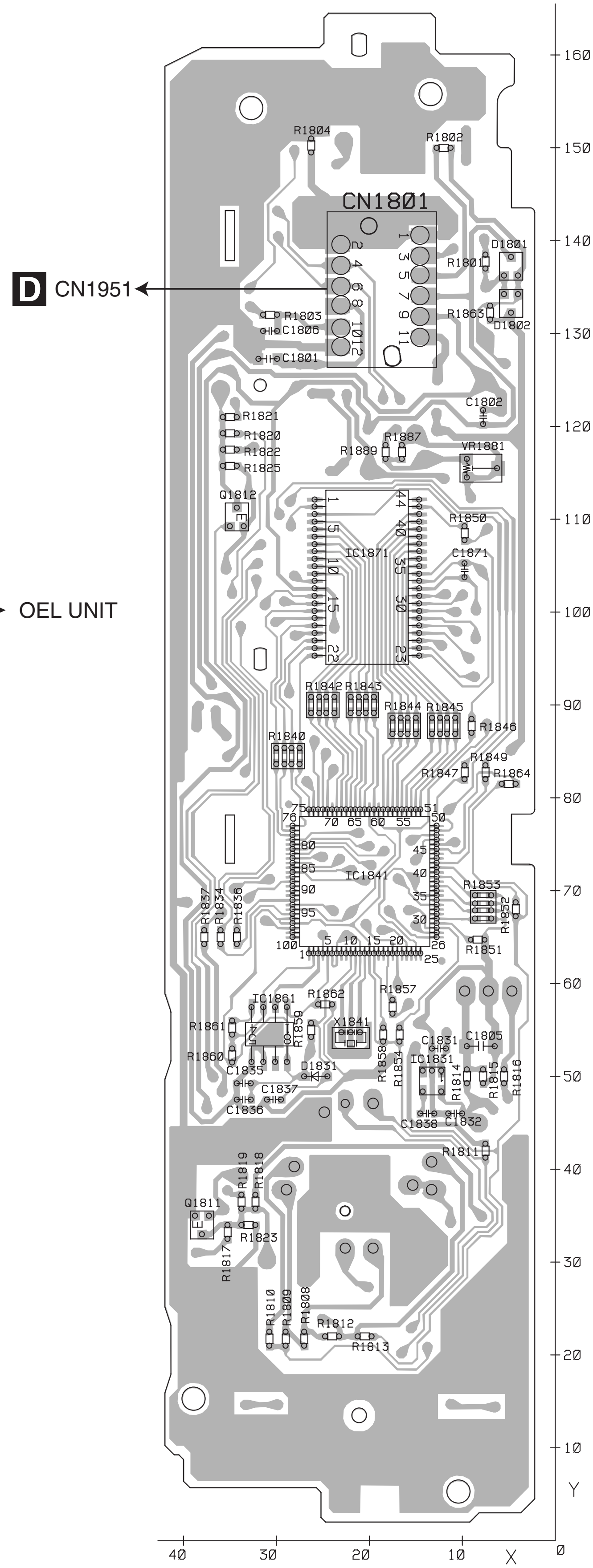
A

4.2 KEYBOARD UNIT

B KEYBOARD UNIT **SIDE A**



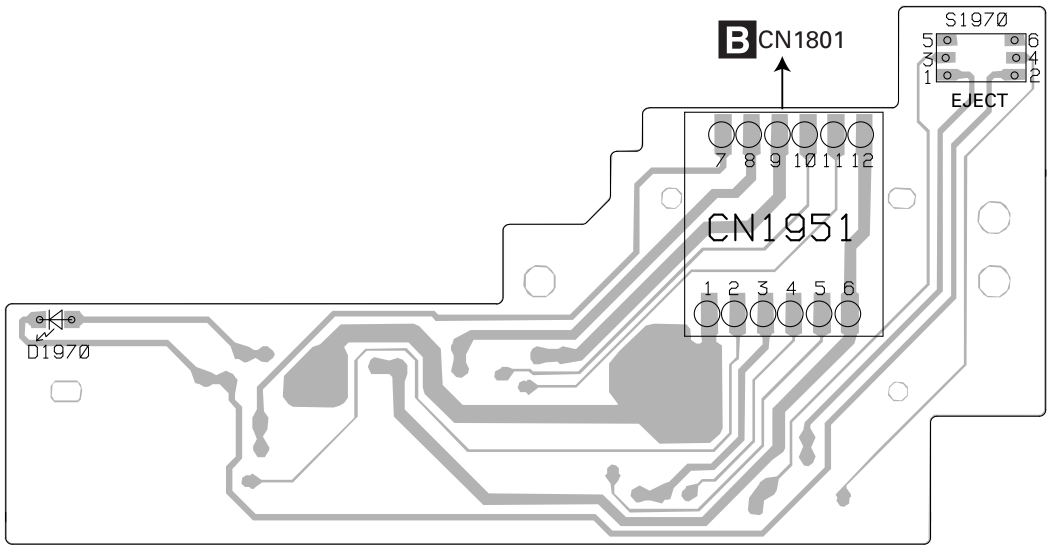
B KEYBOARD UNIT **SIDE B**



4.3 PANEL UNIT

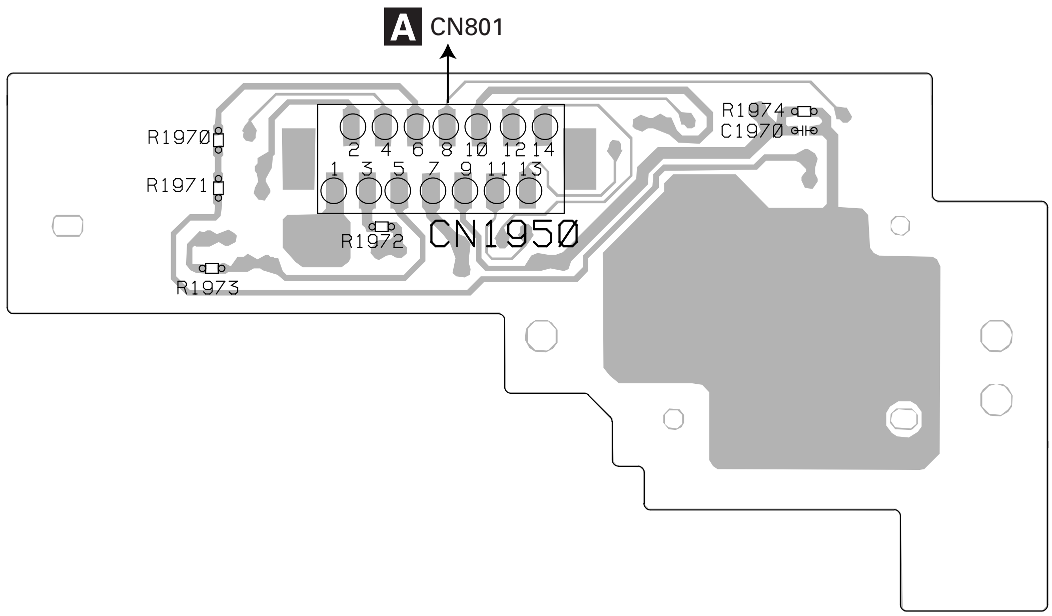
D PANEL UNIT

SIDE A



D PANEL UNIT

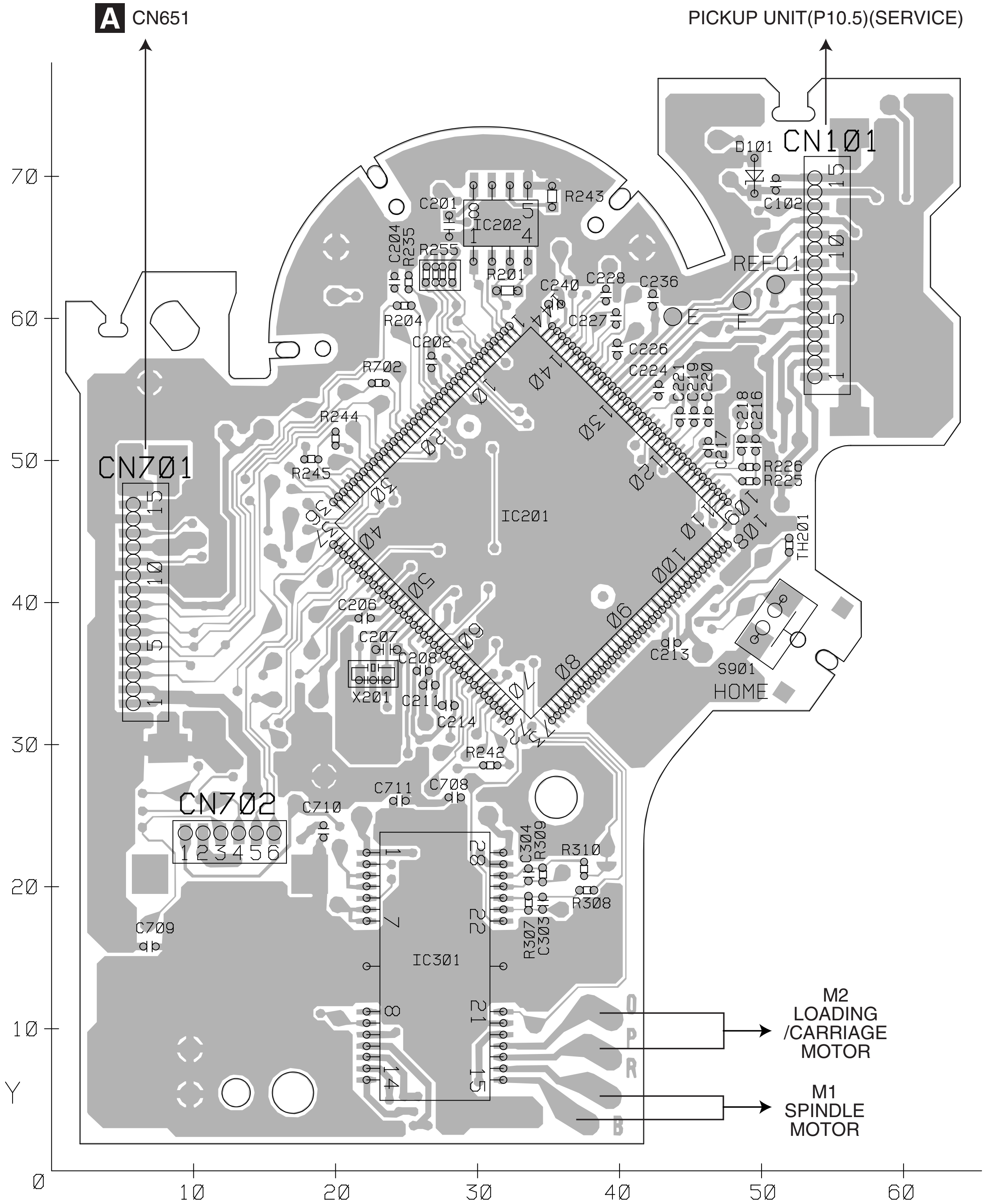
SIDE B



4.4 CD CORE UNIT(S10.5COMP2)

C CD CORE UNIT(S10.5COMP2)

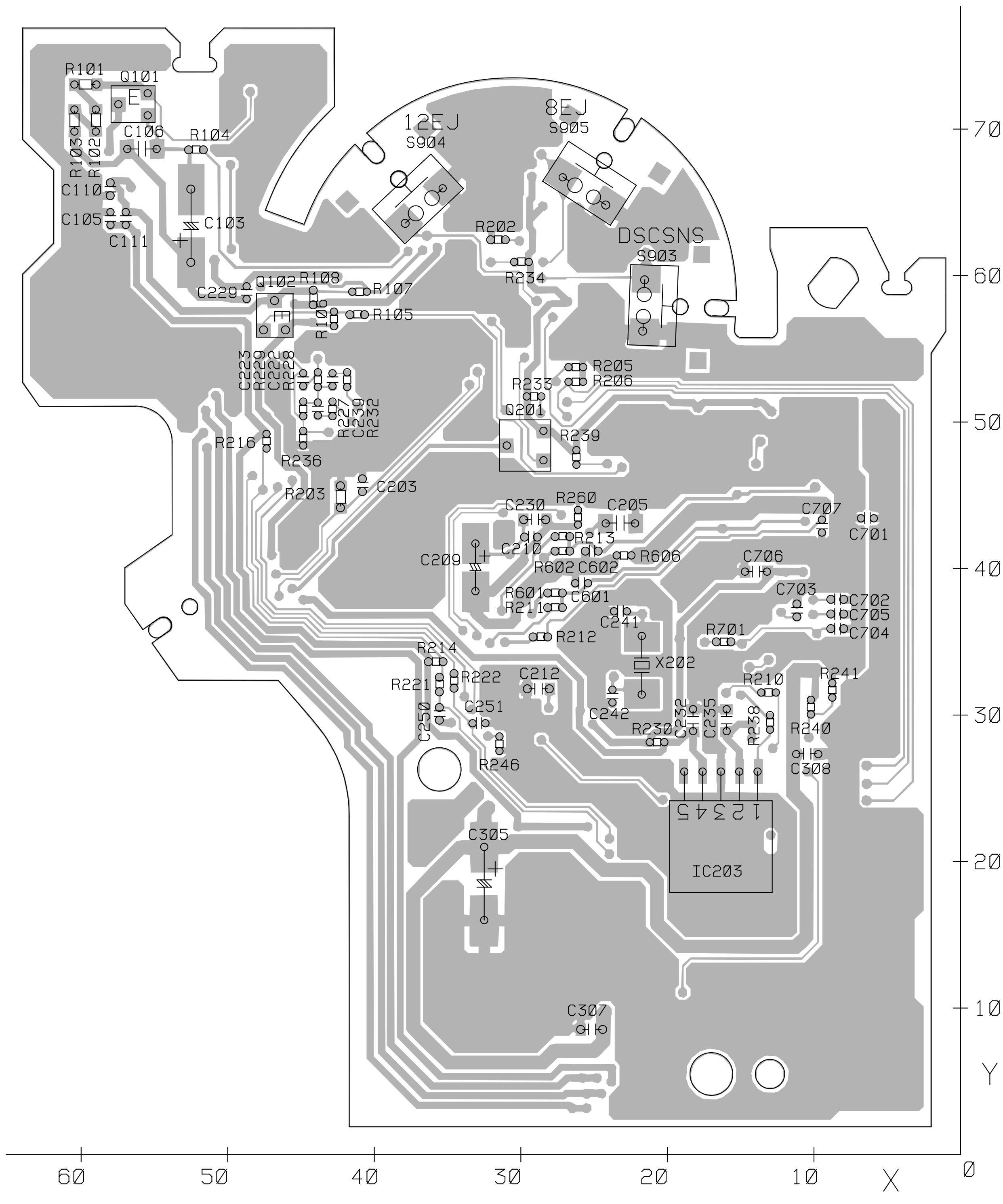
SIDE A



C

C CD CORE UNIT(S10.5COMP2)

SIDE B



5. ELECTRICAL PARTS LIST

NOTE:
- *Parts whose parts numbers are omitted are subject to being not supplied.*
- *The part numbers shown below indicate chip components.*
  Chip Resistor
  RS1/○S○○○J,RS1/○○S○○○J
  Chip Capacitor (except for CQS.....)
  CKS....., CCS....., CSZS.....
- *The ⚠ mark found on some component parts indicates the importance of the safety factor of the part. Therefore, when replacing, be sure to use parts of identical designation.*
- *Meaning of the figures and others in the parentheses in the parts list.*
  Example) IC 301 is on the point (face A, 91 of x-axis, and 111 of y-axis) of the corresponding PC board.
  IC 301 (A, 91, 111) IC NJM2068V

Circuit Symbol and No. **Part No.**

Unit Number : XWM7166
Unit Name : Tuner Amp Unit
Unit Number :
Unit Name : Keyboard Unit
Unit Number : CWX3514
Unit Name : CD Core Unit(S10.5COMP2)
Unit Number : CWM8758
Unit Name : Panel Unit

A

Unit Number : XWM7166
Unit Name : Tuner Amp Unit

MISCELLANEOUS

Circuit Symbol and No.		Part No.
IC 101	(A,44,90) IC	HA12241FP
IC 171	(A,112,86) IC	NJM2794V
IC 201	(A,82,91) IC	PML016B
IC 301	(A,93,135) IC	PAL007C
IC 420	(A,152,28) IC	NJM2885DL1-33
IC 601	(A,109,56) IC	PEG274A
IC 602	(A,84,64) IC	S-80835CNMC-B8U
IC 641	(A,54,35) IC	NJM2885DL1-33
IC 701	(A,116,37) IC	TC7SET08FUS1
IC 702	(A,119,37) IC	TC7SH08FUS1
IC 703	(A,125,79) IC	TC4066BFT
IC 704	(A,131,65) IC	NJM2794V
IC 851	(B,40,20) IC	NJM2360M
IC 901	(A,7,122) IC	NJM2388F84
Q 101	(B,42,106) Transistor	2SA1576A
Q 102	(B,37,104) Transistor	RT1N141M-11
Q 201	(A,48,75) Transistor	2SC4081
Q 202	(A,55,76) Transistor	UMD2N
Q 301	(A,145,92) Transistor	RT1N241M
Q 351	(A,138,129) Transistor	RT3C99M
Q 352	(B,139,128) Transistor	RT3C99M
Q 353	(B,164,132) Transistor	RT3C99M
Q 650	(A,7,69) Transistor	2SD2396
Q 651	(B,22,66) Transistor	UMD2N
Q 701	(A,120,120) Transistor	2SA2060
Q 702	(A,125,125) Transistor	2SA1162
Q 703	(A,122,130) Transistor	2SA2060
Q 705	(B,110,110) Transistor	2SC4081
Q 706	(B,134,83) Transistor	RT1N241M
Q 707	(A,138,92) Transistor	RT1N241M
Q 801	(A,103,29) Transistor	RT1N431M
Q 819	(A,112,25) Transistor	2SA1576A
Q 820	(A,112,31) Transistor	RT1N141M-11
Q 821	(A,34,41) Transistor	2SD1767
Q 822	(B,72,19) Transistor	UMD2N
Q 831	(B,97,30) Transistor	2SA1576A
Q 832	(B,93,22) Transistor	RT1N141M-11
Q 851	(A,18,34) Transistor	2SD1760F5
Q 852	(B,32,35) Transistor	UMD2N
Q 911	(A,7,103) Transistor	2SD2396
Q 912	(B,31,82) Transistor	UMD2N
Q 931	(B,49,97) Transistor	RT3CLLM
Q 941	(A,115,74) Transistor	RT1N141M-11
Q 951	(A,49,98) Transistor	2SA1576A
Q 981	(B,25,93) Transistor	2SC4081
Q 982	(A,141,102) Transistor	UMD2N
D 171	(A,16,129) Diode	HZM6R2ZMWA
D 172	(A,10,130) Diode	HZM6R2ZMWA
D 201	(A,55,80) Diode	HZS12L(B1)
D 202	(A,119,74) Diode	RB706F-40
D 301	(A,102,105) Diode	MPG06G-6415G3
D 302	(A,99,100) Diode	MPG06G-6415G3
D 612	(B,132,50) Diode	MC2850-11
D 650	(A,18,70) Diode	MTZJA8R2(B)
D 801	(B,104,33) Diode	MC2850-11
D 802	(B,114,31) Diode	MC2848-11
D 803	(B,126,34) Diode	MC2846-11
D 804	(B,121,34) Diode	MC2848-11
D 805	(B,109,31) Diode	MC2846-11
D 821	(A,78,14) Diode	HZS9L(B2)

Circuit Symbol and No.			Part No.
D 852	(B,49,18)	Diode	RB411D
D 853	(A,24,29)	Diode	MTZJA10(B)
D 854	(A,89,43)	Diode	MC2848-11
D 901	(A,66,119)	Diode	MPG06G-6415G3
D 902	(A,70,116)	Diode	MPG06G-6415G3
D 911	(A,15,86)	Diode	MPG06G-6415G3
D 912	(A,19,82)	Diode	HZS6L(B1)
D 931	(A,55,103)	Diode	HZS7L(A1)
D 932	(A,49,103)	Diode	HZS7L(C3)
D 942	(A,138,75)	Diode	1SS133
D 951	(A,45,95)	Diode	MC2848-11
D 981	(A,20,90)	Diode	HZS9L(A2)
D 982	(A,97,70)	Diode	MC2848-11
D 984	(A,138,79)	Diode	1SS133
L 101	(A,14,78)	Inductor	LAU2R2K
L 201	(A,66,78)	Ferri-Inductor	LAU4R7K
L 202	(A,58,95)	Ferri-Inductor	LAU100K
L 401	(A,154,51)	Inductor	LAU1R0K
L 402	(A,149,93)	Inductor	LAU1R0K
L 403	(B,156,98)	Chip Coil	LCTAW4R7J2520
L 601	(A,78,57)	Ferri-Inductor	LAU100K
L 701	(A,115,32)	Inductor	CTF1382
L 831	(A,103,24)	Ferri-Inductor	LAU100K
L 851	(A,44,17)	Inductor	CTF1660
L 901	(A,32,109)	Choke Coil 600 μH	CTH1280
L 951	(A,59,103)	Inductor	LAU2R2K
X 601	(A,94,58)	Crystal 20.00 MHz	VSS1167
S 802	(A,23,11)	Switch(DSENS)	CSN1039
⚠FU352	(B,128,136)	Fuse 3 A	CEK1286
TU401	(A,162,103)	FM/AM Tuner Unit	CWE1952
BZ621	(A,137,25)	Buzzer	CPV1062
AR401	(B,161,113)	Surge Protector	IMSA-6801-01Y901
⚠		Fuse 10 A	CEK1208

RESISTORS

Circuit Symbol and No.		Part No.
R 101	(B,38,137)	RS1/16S101J
R 102	(B,38,135)	RS1/16S620J
R 103	(B,39,130)	RS1/16S101J
R 104	(A,38,87)	RS1/16S102J
R 105	(A,50,89)	RS1/16S472J
R 106	(A,51,91)	RS1/16S472J
R 107	(B,28,135)	RS1/16S181J
R 108	(B,26,132)	RS1/16S223J
R 109	(B,37,106)	RS1/16S222J
R 110	(B,30,122)	RS1/16S181J
R 111	(B,28,122)	RS1/16S223J
R 112	(B,26,123)	RS1/16S102J
R 113	(B,29,138)	RS1/16S102J
R 114	(B,45,109)	RS1/16S223J
R 115	(B,40,109)	RS1/16S472J
R 165	(A,79,65)	RS1/16S104J
R 166	(A,77,59)	RS1/16S104J
R 172	(A,111,93)	RS1/16S223J
R 175	(A,103,91)	RS1/16S223J
R 203	(B,36,38)	RS1/16S0R0J
R 209	(A,109,74)	RS1/16S221J
R 210	(A,72,96)	RS1/16S221J
R 212	(A,52,75)	RS1/16S152J
R 213	(A,73,93)	RAB4C102J
R 301	(A,146,89)	RS1/16S103J
R 302	(A,140,95)	RS1/16S331J
R 303	(A,144,89)	RS1/16S103J
R 304	(A,151,105)	RS1/16S153J
R 305	(B,90,92)	RS1/16S682J
R 306	(B,102,96)	RS1/16S682J
R 307	(B,104,89)	RS1/16S682J
R 308	(B,103,93)	RS1/16S682J
R 309	(B,97,91)	RS1/16S123J
R 310	(B,103,91)	RS1/16S123J
R 311	(B,107,95)	RS1/16S123J
R 312	(B,108,92)	RS1/16S123J
R 351	(B,138,113)	RS1/16S390J
R 352	(A,137,125)	RS1/16S472J
R 353	(A,139,127)	RS1/16S472J
R 354	(B,161,136)	RS1/16S223J
R 355	(A,143,129)	RS1/16S223J
R 358	(A,133,129)	RS1/16S390J
R 359	(A,145,124)	RS1/16S390J
R 360	(B,143,125)	RS1/16S472J
R 361	(A,142,124)	RS1/16S223J
R 363	(B,134,129)	RS1/16S472J
R 364	(B,128,132)	RS1/16S223J
R 366	(B,132,129)	RS1/16S390J
R 367	(B,163,124)	RS1/16S390J
R 368	(B,168,127)	RS1/16S472J
R 369	(A,157,127)	RS1/16S223J
R 371	(B,159,124)	RS1/16S390J
R 372	(B,164,127)	RS1/16S472J
R 373	(B,164,136)	RS1/16S223J
R 401	(B,154,66)	RS1/16S0R0J
R 403	(B,160,72)	RS1/16S681J
R 404	(B,114,49)	RS1/16S681J
R 406	(B,157,82)	RS1/16S681J
R 407	(B,118,52)	RS1/16S681J
R 408	(B,157,85)	RS1/16S681J
R 409	(B,157,87)	RS1/16S681J
R 411	(B,158,89)	RS1/16S681J
R 413	(B,157,91)	RS1/16S681J
R 424	(B,117,54)	RS1/16S681J
R 602	(B,107,64)	RS1/16S104J
R 605	(B,114,59)	RS1/16S104J
R 606	(A,91,65)	RS1/16S104J
R 607	(B,82,58)	RS1/16S822J
R 608	(B,101,59)	RS1/16S102J
R 609	(A,96,42)	RS1/16S102J
R 610	(A,91,63)	RS1/16S471J
R 611	(B,102,54)	RS1/16S473J
R 612	(B,120,120)	RS1/16S682J
R 613	(B,123,124)	RS1/16S152J
R 614	(A,91,66)	RS1/16S0R0J
R 621	(B,102,40)	RS1/16S102J
R 631	(A,131,49)	RS1/16S104J
R 640	(A,74,35)	RS1/16S104J
R 642	(A,71,39)	RS1/16S682J
R 643	(A,104,41)	RS1/16S221J
R 645	(A,85,69)	RS1/16S221J
R 646	(B,71,36)	RS1/16S221J
R 647	(A,71,35)	RS1/16S221J
R 649	(B,71,34)	RS1/16S104J
R 651	(A,18,64)	RD1/4PU561J

Circuit Symbol and No.		Part No.
R 653	(A,71,30)	RS1/16S221J
R 654	(A,74,32)	RS1/16S104J
R 666	(B,86,41)	RS1/16S104J
R 673	(B,88,41)	RS1/16S682J
R 701	(A,117,42)	RS1/16S102J
R 702	(A,107,42)	RS1/16S102J
R 705	(A,124,121)	RS1/16S103J
R 706	(A,122,116)	RS1/16S102J
R 707	(A,128,115)	RS2PMFR47J
R 708	(A,121,125)	RS1/16S103J
R 709	(A,106,99)	RD1/4PU102J
R 710	(A,108,99)	RD1/4PU102J
R 711	(A,139,87)	RS1/16S104J
R 712	(A,133,95)	RS1/16S514J
R 713	(A,135,94)	RS1/16S393J
R 714	(A,135,90)	RS1/16S104J
R 716	(A,134,88)	RS1/16S102J
R 717	(A,133,93)	RS1/16S472J
R 718	(A,135,46)	RS1/16S472J
R 720	(A,120,40)	RS1/16S102J
R 721	(A,125,33)	RS1/16S102J
R 722	(A,125,35)	RS1/16S104J
R 723	(A,111,102)	RD1/4PU102J
R 724	(A,117,131)	RS1/16S103J
R 725	(A,114,102)	RD1/4PU102J
R 726	(B,110,113)	RS1/16S103J
R 728	(B,114,110)	RS1/16S103J
R 731	(A,135,77)	RS1/16S223J
R 734	(A,132,75)	RS1/16S223J
R 801	(B,102,38)	RS1/16S473J
R 802	(A,66,16)	RS1/16S104J
R 803	(A,66,14)	RS1/16S102J
R 804	(A,126,25)	RD1/4PU222J
R 805	(A,129,25)	RD1/4PU222J
R 806	(A,122,25)	RD1/4PU222J
R 807	(A,119,25)	RD1/4PU222J
R 808	(B,114,26)	RS1/16S222J
R 809	(A,106,23)	RD1/4PU222J
R 810	(B,132,27)	RS1/16S102J
R 811	(B,117,35)	RS1/16S102J
R 812	(B,109,34)	RS1/16S102J
R 813	(A,80,18)	RS1/16S1R0J
R 814	(B,111,26)	RS1/16S222J
R 815	(B,113,36)	RS1/16S473J
R 816	(B,112,26)	RS1/16S473J
R 817	(B,104,30)	RS1/16S473J
R 818	(B,134,27)	RS1/16S104J
R 819	(A,109,25)	RS1/16S473J
R 820	(A,112,28)	RS1/16S472J
R 821	(A,43,45)	RD1/4PU391J
R 824	(A,83,18)	RS1/16S472J
R 825	(B,46,41)	RS1/16S102J
R 831	(B,94,30)	RS1/16S473J
R 832	(B,96,26)	RS1/16S102J
R 833	(B,101,21)	RS1/16S222J
R 850	(A,28,37)	RD1/4PU681J
R 852	(A,33,26)	RS1/16S1R0J
R 857	(B,38,25)	RS1/16S391J
R 858	(A,38,29)	RD1/4PU272J
R 859	(B,38,27)	RS1/16S391J

Circuit Symbol and No.		Part No.
R 860	(B,33,24)	RS1/16S391J
R 901	(B,21,99)	RS1/16S102J
R 902	(B,20,100)	RS1/16S103J
R 912	(B,34,81)	RS1/16S222J
R 913	(B,12,81)	RS1/16S223J
R 914	(A,45,66)	RS1/16S104J
R 915	(A,41,64)	RS1/16S104J
R 916	(A,112,71)	RS1/16S104J
R 918	(B,11,107)	RS1/16S391J
R 931	(A,52,103)	RD1/4PU102J
R 932	(B,47,106)	RS1/16S472J
R 933	(B,50,100)	RS1/16S473J
R 934	(B,53,99)	RS1/16S103J
R 935	(B,42,104)	RS1/16S473J
R 936	(B,45,102)	RS1/16S104J
R 941	(A,64,103)	RD1/4PU102J
R 942	(B,141,73)	RS1/16S103J
R 951	(A,62,103)	RD1/4PU153J
R 952	(A,46,98)	RS1/16S472J
R 953	(A,51,94)	RS1/16S472J
R 954	(A,52,97)	RS1/16S102J
R 981	(B,22,96)	RS1/16S683J
R 982	(B,22,93)	RS1/16S683J
R 983	(B,24,87)	RS1/16S223J
R 984	(A,142,95)	RS1/16S102J

CAPACITORS

C 101	(B,33,139)	CKSRYB104K16
C 102	(A,41,86)	CKSRYB104K16
C 103	(A,41,94)	CCSRCH101J50
C 104	(A,44,86)	CCSRCH101J50
C 171	(A,109,93)	CKSRYB472K50
C 173	(A,103,89)	CKSRYB472K50
C 176	(B,15,140)	CKSRYB104K16
C 180	(A,105,87)	CKSRYB105K10
C 181	(A,120,86)	CEJQ2R2M50
C 182	(A,107,90)	CKSRYB105K10
C 183	(A,102,86)	CKSRYB105K10
C 185	(A,105,85)	CKSRYB105K10
C 201	(B,73,92)	CKSRYB474K10
C 202	(A,74,74)	CKSRYB104K16
C 204	(B,75,81)	CKSRYB104K16
C 205	(B,73,94)	CKSRYB105K10
C 206	(B,63,85)	CKSQYB225K10
C 207	(A,72,84)	CEJQ100M25
C 208	(A,76,79)	CEJQ470M16
C 209	(A,62,82)	CEJQ470M16
C 210	(A,91,97)	CKSRYB104K16
C 213	(B,86,96)	CCSRCH120J50
C 214	(B,82,96)	CCSRCH120J50
C 215	(B,81,93)	CCSRCH120J50
C 216	(B,81,90)	CCSRCH120J50
C 217	(B,78,83)	CKSRYB104K16
C 219	(A,66,94)	CEJQ1R0M50
C 220	(A,69,99)	CEJQ4R7M35
C 221	(A,73,103)	CEJQ4R7M35
C 222	(A,77,103)	CEJQ4R7M35
C 223	(A,83,103)	CEJQ4R7M35
C 224	(A,90,103)	CEJQ4R7M35

Circuit Symbol and No.		Part No.
C 225	(A,81,79)	CEJQ4R7M35
C 226	(A,88,79)	CEJQ4R7M35
C 227	(A,97,78)	CEJQ4R7M35
C 229	(A,64,88)	CEJQ1R0M50
C 230	(A,81,73)	CEJQ4R7M35
C 231	(A,89,73)	CEJQ4R7M35
C 232	(B,50,84)	CKSRYB103K50
C 233	(B,55,82)	CKSRYB104K16
C 234	(A,56,85)	CEJQ470M16
C 235	(A,96,86)	CEJQ100M25
C 236	(A,78,108)	CKSRYB105K10
C 237	(A,76,74)	CKSRYB105K10
C 240	(A,106,70)	CCSRCH470J50
C 309	(A,136,107)	CEJQ330M10
C 311	(A,126,135)	CKSQYB225K10
C 312	(A,126,132)	CKSQYB225K10
C 313	(A,135,122)	CEJQ100M25
C 314	(B,120,127)	CKSRYB474K10
C 315	(B,115,117)	CKSRYB474K10
C 316	(B,121,131)	CKSQYB474K25
C 317	(B,115,121)	CKSQYB474K25
C 318	(B,123,128)	CKSRYB474K10
C 319	(B,113,116)	CKSRYB474K10
C 320	(B,123,132)	CKSQYB474K25
C 321	(B,113,120)	CKSQYB474K25
C 359	(A,141,110)	CEJQ100M25
C 360	(A,141,117)	CEJQ100M25
C 361	(A,146,117)	CEJQ100M25
C 362	(A,146,110)	CEJQ100M25
C 363	(A,159,120)	CEJQ100M25
C 364	(A,152,120)	CEJQ100M25
C 402	(B,159,58)	CKSRYB103K50
C 405	(B,147,96)	CKSRYB103K50
C 406	(A,149,99)	CEJQ101M16
C 408	(B,159,61)	CKSRYB103K50
C 415	(A,155,57)	CEJQ470M6R3
C 420	(A,151,41)	CEJQ470M6R3
C 422	(A,141,36)	CEJQ1R0M50
C 430	(B,111,54)	CCSRCH470J50
C 601	(B,85,52)	CKSRYB105K10
C 602	(A,88,53)	CEJQ4R7M35
C 603	(B,101,57)	CCSRCH101J50
C 604	(A,83,55)	CEJQ2R2M50
C 605	(B,91,57)	CCSRCH100D50
C 606	(B,96,54)	CCSRCH100D50
C 608	(A,109,72)	CKSRYB102K50
C 650	(B,14,73)	CKSRYB473K50
C 651	(B,55,43)	CKSRYB104K16
C 659	(A,50,43)	CEJQ101M16
C 660	(B,50,33)	CKSRYB105K10
C 661	(B,69,47)	CKSRYB103K50
C 662	(A,49,27)	CEJQ470M6R3
C 663	(A,72,48)	CEJQ4R7M35
C 667	(B,65,64)	CKSRYB105K10
C 701	(A,118,33)	CKSRYB473K50
C 702	(A,120,33)	CKSRYB473K50
C 703	(A,117,125)	CKSYB475K16
C 705	(A,136,71)	CKSRYB105K10
C 706	(A,133,71)	CKSRYB105K10
C 708	(B,140,87)	CKSRYB103K50

Circuit Symbol and No.		Part No.
C 709	(A,129,73)	CKSRYB105K10
C 710	(A,131,71)	CKSRYB105K10
C 711	(A,127,61)	CKSRYB104K16
C 712	(A,123,67)	CEJQ330M10
C 716	(A,122,83)	CKSRYB473K50
C 717	(A,136,60)	CEJQ2R2M50
C 821	(B,77,17)	CKSRYB473K50
C 822	(A,83,16)	CKSRYB473K50
C 852	(B,41,31)	CKSRYB223K50
C 854	(B,45,16)	CCSRCH331J50
C 855	(B,29,20)	CKSRYB104K16
C 856	(B,21,33)	CKSRYB104K16
C 857	(B,19,35)	CKSYB475K16
C 858	(A,57,19)	CEJQ470M25
C 859	(A,33,20)	CEJQ101M16
C 860	(A,27,25)	CEJQ470M16
C 901	(A,51,124) 3 300 µF/16 V	CCH1486
C 902	(B,61,122)	CKSRYB104K16
C 911	(A,25,74)	CEAT102M16
C 912	(B,23,83)	CKSRYB472K50
C 913	(B,33,68)	CKSRYB103K50
C 914	(A,35,68)	CEJQ470M16
C 915	(A,37,77)	CEJQ221M16
C 922	(B,16,117)	CKSRYB103K50
C 923	(A,16,96)	CEJQ101M16
C 924	(B,29,91)	CKSRYB103K50
C 925	(A,26,84)	CEJQ221M16
C 931	(B,45,106)	CKSRYB104K16
C 941	(A,140,71)	CEJQ1R0M50
C 984	(A,140,83)	CEJQ220M16

B

Unit Number :
Unit Name : Keyboard Unit

MISCELLANEOUS

IC 1811	(A,5,59) IC	GP1UX31RK
IC 1831	(B,13,50) IC	S-1200B33-M5
IC 1841	(B,21,71) IC	PEG272A
IC 1871	(B,20,104) IC	PD8168A
Q 1811	(B,38,34) Transistor	RT1N237M
Q 1812	(B,34,110) Transistor	RT1N237M
Q 1881	(A,22,138) Transistor	2SC4617
Q 1882	(A,19,137) Transistor	2SC2411K
D 1811	(A,8,10) LED	SML412BC5T(NP)
D 1812	(A,34,10) LED	SML412BC5T(NP)
D 1813	(A,22,22) LED	SML412BC5T(NP)
D 1814	(A,4,40) LED	SML412BC5T(NP)
D 1815	(A,22,57) LED	SML412BC5T(NP)
D 1816	(A,38,40) LED	SML412BC5T(NP)
D 1817	(A,40,103) LED	SML412BC5T(NP)
D 1818	(A,40,82) LED	SML412BC5T(NP)
D 1819	(A,40,131) LED	SML412BC5T(NP)
D 1820	(A,40,117) LED	SML412BC5T(NP)
D 1821	(A,6,158) LED	SML412BC5T(NP)
D 1822	(A,40,144) LED	SML412BC5T(NP)
D 1831	(B,26,50) Diode	1SS355
L 1831	(A,29,62) Inductor	CTF1617
L 1881	(A,23,130) Inductor	CTF1617

Circuit Symbol and No.			Part No.
L 1882	(A,28,115)	Inductor	CTF1617
TH1881	(A,26,138)	Thermistor	CCX1037
X 1841	(B,22,55)	Ceramic Resonator 16.000 MHz	CSS1616
S 1803	(A,5,9)	Push Switch	CSG1155
S 1804	(A,39,107)	Push Switch	CSG1155
S 1805	(A,39,148)	Push Switch	CSG1155
S 1806	(A,39,78)	Push Switch	CSG1155
S 1807	(A,39,120)	Push Switch	CSG1155
S 1808	(A,39,134)	Push Switch	CSG1155
S 1809	(A,37,9)	Push Switch	CSG1155
S 1810	(A,21,39)	Switch(MULTI-CONTROL)	CSX1120

RESISTORS

R 1801	(B,8,138)	RS1/16S222J
R 1802	(B,12,150)	RS1/16S222J
R 1803	(B,31,132)	RS1/16S473J
R 1808	(B,27,22)	RS1/16S332J
R 1809	(B,29,22)	RS1/16S103J
R 1810	(B,31,22)	RS1/16S333J
R 1811	(B,8,42)	RS1/16S103J
R 1812	(B,24,22)	RS1/16S222J
R 1813	(B,21,22)	RS1/16S103J
R 1814	(B,10,50)	RS1/16S101J
R 1815	(B,8,50)	RS1/16S103J
R 1816	(B,6,50)	RS1/16S2R2J
R 1817	(B,35,33)	RS1/16S271J
R 1818	(B,32,37)	RS1/16S271J
R 1819	(B,34,37)	RS1/16S271J
R 1820	(B,35,119)	RS1/16S271J
R 1821	(B,35,121)	RS1/16S271J
R 1822	(B,35,118)	RS1/16S271J
R 1823	(B,33,34)	RS1/16S121J
R 1825	(B,35,116)	RS1/16S121J
R 1833	(A,31,56)	RS1/16S222J
R 1834	(B,36,65)	RS1/16S101J
R 1835	(A,28,69)	RS1/16S101J
R 1836	(B,34,65)	RS1/16S101J
R 1837	(B,38,65)	RS1/16S101J
R 1838	(A,27,94)	RAB4C101J
R 1839	(A,11,84)	RAB4C101J
R 1840	(B,29,85)	RAB4C101J
R 1841	(A,23,94)	RAB4C101J
R 1842	(B,25,90)	RAB4C101J
R 1843	(B,21,90)	RAB4C101J
R 1844	(B,16,88)	RAB4C101J
R 1845	(B,12,88)	RAB4C101J
R 1846	(B,9,88)	RS1/16S101J
R 1847	(B,10,83)	RS1/16S101J
R 1848	(A,26,104)	RS1/16S101J
R 1849	(B,8,83)	RS1/16S101J
R 1850	(B,10,109)	RS1/16S101J
R 1851	(B,8,65)	RS1/16S473J
R 1852	(B,4,68)	RS1/16S473J
R 1853	(B,8,68)	RAB4C473J
R 1855	(A,29,69)	RS1/16S101J
R 1856	(A,26,69)	RS1/16S101J
R 1857	(B,18,58)	RS1/16S101J
R 1858	(B,19,55)	RS1/16S473J
R 1859	(B,26,55)	RS1/16S154J

Circuit Symbol and No.		Part No.
R 1860	(B,35,52)	RS1/16S104J
R 1863	(B,7,132)	RS1/16S103J
R 1881	(A,20,134)	RS1/16S183J
R 1882	(A,24,138)	RS1/16S563J
R 1883	(A,25,142)	RS1/16S333J
R 1884	(A,23,142)	RS1/16S392J
R 1885	(A,26,110)	RAB4C102J
R 1887	(B,17,117)	RS1/16S0R0J
R 1889	(B,18,117)	RS1/16S5101D

CAPACITORS

C 1805	(B,8,53)	CKSYF106Z10
C 1806	(B,31,130)	CKSRYB104K16
C 1811	(A,13,11)	CKSRYF104Z50
C 1812	(A,31,9)	CKSRYF104Z50
C 1813	(A,22,20)	CKSRYF104Z50
C 1814	(A,4,44)	CKSRYF104Z50
C 1815	(A,22,58)	CKSRYF104Z50
C 1816	(A,39,44)	CKSRYF104Z50
C 1817	(A,40,97)	CKSRYF104Z50
C 1818	(A,40,84)	CKSRYF104Z50
C 1819	(A,40,126)	CKSRYF104Z50
C 1820	(A,40,112)	CKSRYF104Z50
C 1821	(A,13,152)	CKSRYF104Z50
C 1822	(A,40,139)	CKSRYF104Z50
C 1831	(B,13,53)	CKSRYB224K10
C 1832	(B,11,46)	CKSRYB224K10
C 1833	(A,36,60)	CKSRYB103K50
C 1837	(B,30,48)	CKSRYB104K16
C 1871	(B,10,105)	CKSRYB103K50
C 1882	(A,27,134)	CKSRYB104K25
C 1883	(A,24,134)	CKSRYB104K25
C 1884	(A,23,104)	CKSRYB104K25
C 1885	(A,27,119)	CKSRYB104K25
C 1886	(A,24,119)	CKSRYB104K25
C 1887	(A,22,134)	CKSRYB104K25

C

Unit Number : CWX3514
Unit Name : CD Core Unit(S10.5COMP2)

MISCELLANEOUS

IC 201	(A,34,46)	IC	PE5547A
IC 301	(A,27,14)	IC	BA5839FP
Q 101	(B,56,72)	Transistor	2SA1577
Q 102	(B,47,57)	Transistor	2SB1689
X 201	(A,23,35)	Ceramic Resonator 16.934 MHz	CSS1603
S 901	(A,53,37)	Switch(HOME)	CSN1067
S 903	(B,19,58)	Switch(DSCSNS)	CSN1067
S 904	(B,38,67)	Switch(12EJ)	CSN1068
S 905	(B,24,68)	Switch(8EJ)	CSN1068

RESISTORS

R 101	(B,60,73)	RS1/10SR2R4J
R 102	(B,59,71)	RS1/10SR2R4J
R 103	(B,60,71)	RS1/10SR2R7J
R 104	(B,52,69)	RS1/16SS222J
R 105	(B,41,57)	RS1/16SS102J

Circuit Symbol and No.		Part No.
R 107	(B,41,59)	RS1/16SS105J
R 202	(B,32,62)	RS1/16SS473J
R 203	(B,42,45)	RS1/16S473J
R 204	(A,25,61)	RS1/16SS221J
R 206	(B,26,53)	RS1/16SS104J
R 210	(B,13,32)	RS1/16SS102J
R 214	(B,36,34)	RS1/16SS472J
R 216	(B,47,49)	RS1/16SS472J
R 221	(B,36,32)	RS1/16SS103J
R 222	(B,35,32)	RS1/16SS103J
R 225	(A,49,49)	RS1/16SS103J
R 226	(A,49,50)	RS1/16SS393J
R 227	(B,45,51)	RS1/16SS562J
R 228	(B,42,53)	RS1/16SS122J
R 229	(B,44,53)	RS1/16SS472J
R 230	(B,21,28)	RS1/16SS0R0J
R 232	(B,43,51)	RS1/16SS122J
R 233	(B,29,52)	RS1/16SS103J
R 234	(B,30,61)	RS1/16SS473J
R 235	(A,25,63)	RS1/16SS473J
R 239	(B,26,48)	RS1/16SS473J
R 240	(B,10,31)	RS1/16SS473J
R 241	(B,9,32)	RS1/16SS103J
R 244	(A,20,52)	RS1/16SS473J
R 255	(A,27,63)	RAB4CQ104J
R 307	(A,34,19)	RS1/16SS183J
R 308	(A,38,20)	RS1/16SS183J
R 309	(A,35,21)	RS1/16SS183J
R 310	(A,38,21)	RS1/16SS183J
R 601	(B,28,38)	RS1/16SS0R0J
R 602	(B,27,41)	RS1/16SS0R0J
R 606	(B,23,41)	RS1/16SS0R0J
R 701	(B,16,35)	RS1/16SS221J
R 702	(A,23,55)	RS1/16SS221J

CAPACITORS

C 106	(B,56,69)	CKSQYB475K6R3
C 202	(A,27,57)	CKSSYB104K10
C 204	(A,24,63)	CKSSYB103K16
C 205	(B,23,43)	CKSQYB475K6R3
C 206	(A,22,39)	CKSSYB104K10
C 207	(A,24,37)	CKSRYB104K16
C 209	(B,33,40)	CEVW220M6R3
C 210	(B,29,42)	CKSSYB104K10
C 211	(A,27,34)	CKSSYB104K10
C 212	(B,29,32)	CKSRYB104K16
C 213	(A,44,37)	CKSSYB104K10
C 214	(A,28,33)	CKSSYB104K10
C 216	(A,50,51)	CKSSYB332K50
C 217	(A,46,51)	CKSSYB104K10
C 218	(A,49,51)	CKSSYB473K10
C 219	(A,45,53)	CKSSYB104K10
C 220	(A,46,53)	CKSSYB182K50
C 221	(A,44,53)	CKSSYB104K10
C 222	(B,43,53)	CCSSCH560J50
C 223	(B,45,53)	CCSSCH4R0C50
C 224	(A,43,55)	CKSSYB104K10
C 226	(A,40,58)	CCSSCH680J50
C 227	(A,40,60)	CCSSCH470J50

Circuit Symbol and No.		Part No.
C 228	(A,39,62)	CKSSYB103K16
C 229	(B,49,59)	CKSSYB104K10
C 236	(A,42,61)	CKSSYB104K10
C 239	(B,44,51)	CCSSCH220J50
C 240	(A,35,61)	CKSSYB104K10
C 250	(B,36,30)	CKSSYB102K50
C 251	(B,33,29)	CKSSYB102K50
C 303	(A,35,19)	CKSSYB472K25
C 304	(A,34,21)	CKSSYB223K16
C 307	(B,25,9)	CKSRYB104K16
C 308	(B,10,27)	CKSRYB105K10
C 703	(B,11,37)	CCSSCH101J50
C 704	(B,8,36)	CKSSYB102K50
C 711	(A,25,26)	CKSSYB104K10

D

Unit Number : CWM8758
Unit Name : Panel Unit

MISCELLANEOUS

D 1970	LED	CL220PGC
S 1970	Push Switch(EJECT)	CSG1112

RESISTORS

R 1970		RS1/16S101J
R 1971		RS1/16S101J
R 1972		RS1/16S0R0J

CAPACITORS

C 1970		CKSRYB104K16

Miscellaneous Parts List

	Pickup Unit(P10.5)(Service)	CXX1942
M 1	Motor Unit(SPINDLE)	CXC7134
M 2	Motor Unit(LOADING/CARRIAGE)	CXC4026

6. ADJUSTMENT

6.1 CD ADJUSTMENT

1) Cautions on adjustments

• In this product the single voltage (3.3 V) is used for the regulator. The reference voltage is the REFO1 (1.65 V) instead of the GND.

If you should mistakenly short the REFO1 with the GND during adjustment, accurate voltage will not be obtained, and the servo's misoperation will apply excessive shock to the pickup. To avoid such problems:

a. Do not mix up the REFO1 with the GND when connecting the (-) probe of measuring instruments. Especially on an oscilloscope, avoid connecting the (-) probe for CH1 to the GND.

b. In many cases, measuring instruments have the same potential as that for the (-) probe. Be sure to set the measuring instruments to the floating state.

c. If you have mistakenly connected the REFO1 to the GND, turn off the regulator or the power immediately.

• Before mounting and removing filters or leads for adjustment, be sure to turn off the regulator.

• For stable circuit operation, keep the mechanism operating for about one minute or more after the regulator is turned on.

• In the test mode, any software protections will not work. Avoid applying any mechanical or electrical shock to the mechanism during adjustment.

• The RFI and RFO signals with a wide frequency range are easy to oscillate. When observing the signals, insert a resistor of 1 k ohms in series.

• The load and eject operation is not guarantied with the mechanism upside down. If the mechanism is blocked due to mistaken eject operation, reset the product or turn off and on the ACC to restore it.

2) Test mode

This mode is used to adjust the CD mechanism module.

• To enter the test mode.

While pressing the LIST and CLOCK keys at the same time, reset.

• To exit from the test mode.

Turn off the ACC or back up.

Notes:

a. During ejection, do not press any other keys than the EJECT key until the loaded disc is ejected.

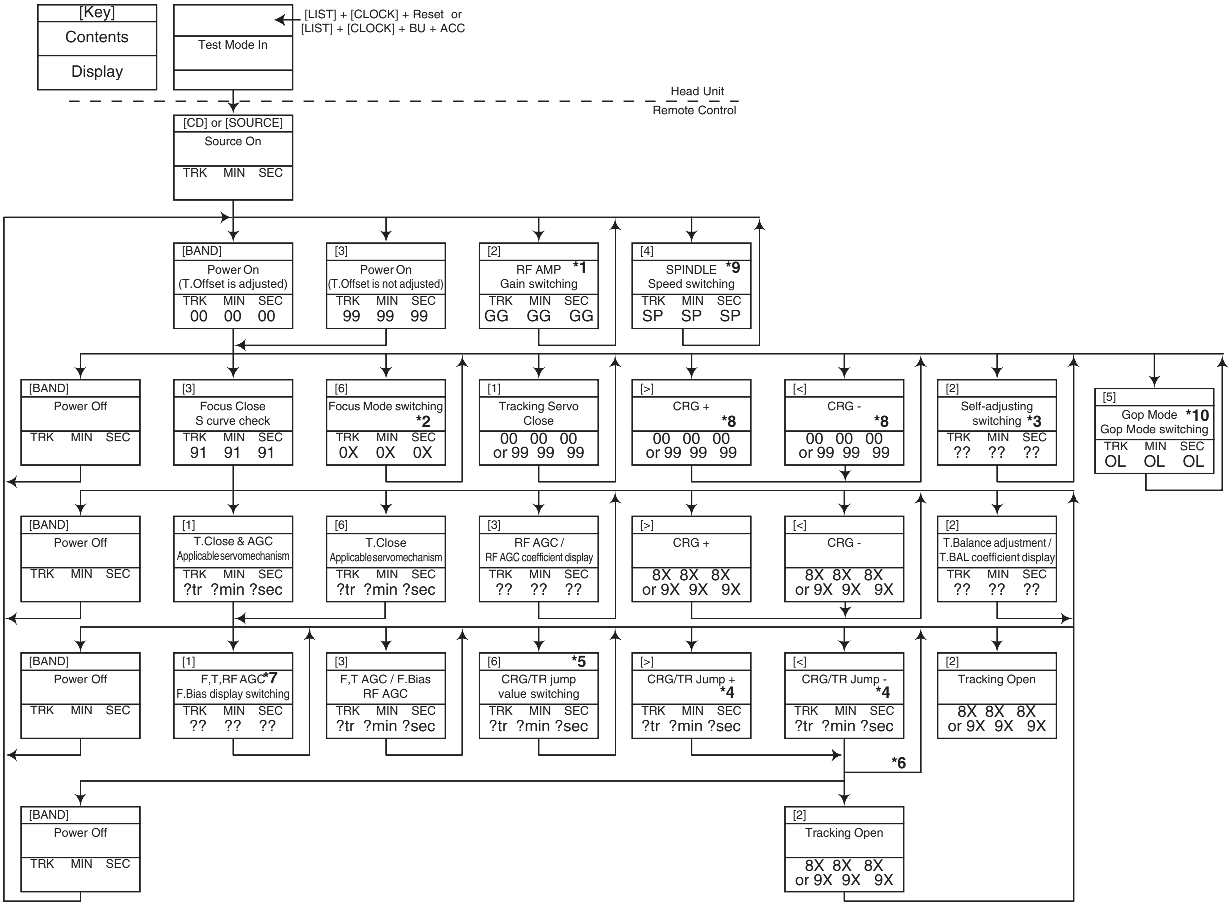
b. If you have pressed the (→) key or (←) key during focus search, turn off the power immediately to protect the actuator from damage caused by the lens stuck.

c. For the TR jump modes except 100TR, the track jump operation will continue even if the key is released.

d. For the CRG move and 100TR jump modes, the tracking loop will be closed at the same time when the key is released.

e. When the power is turned off and on, the jump mode is reset to the single TR (91), the RF amp gain is set to 0 dB, and the auto-adjustment values are reset to the default settings.

● Flow Chart



*1) TYP (TRK MIN SEC) → + 6 dB (TRK06 MIN06 SEC06) → + 12 dB (TRK12 MIN12 SEC12)

*2) Focus Close → S Curve check setting → F EQ measurement setting
TRK00 MIN00 SEC00 (TRK99 MIN99 SEC99) → TRK01 MIN01 SEC01 → TRK02 MIN02 SEC02

*3) F.Offset Display → RF.Offset → T.Offset Display → Switch to the order of the original display

*4) 1TR/4TR/10TR/32TR/100TR

*5) Single → 4TR → 10TR → 32TR → 100TR → CRG Move
9x(8x):91(81) 92(82) 93(83) 94(84) 95(85) 96(86)

*6) Only at the time of CRG move, 100TR jump

*7) TRK/MIN/SEC → F.AGC → T.AGC Gain → F.Bias → RF AGC

*8) CRG motor voltage = 2 [V]

*9) TYP (1X) (TRK MIN SEC) → 2X (TRK22 MIN22 SEC22) → 1X (TRK11 MIN11 SEC11)

*10) OFF(TYP) (TRK MIN SEC) → FORCUS (TRK70 MIN70 SEC70) → TRACKING (TRK71 MIN71 SEC71)

[Key]	Operation Test Mode
[BAND]	Power On/Off
[>]	CRG + / TR Jump + (Direction of the external surface)
[<]	CRG - / TR Jump - (Direction of the internal surface)
[1]	T. CLS & AGC & Applicable servomechanism / AGC,AGC display setting
[2]	RF Gain switching / Offset adjustment display / T.Balance adjustment / T. Open
[3]	F. Close,S Curve / Rough Servo and RF AGC / F,T,RF AGC
[4]	SPDL 1X/2X switching As for the double speed(2x), audio output <u>cannot</u> be supported.
[5]	Error Rate measurement ON : ERR 30Counts Start BER display data[%]
[6]	F. Mode switching / Tracking Close / CRG•TR Jump Switching

• As for the double speed (2x), audio output <u>cannot</u> be supported

*) • After the [Eject] key is pressed keys other than the [Eject] key should not be pressed, until disc ejection is complete.
• When the key [2] or [3] is pressed during the Focus Search, the power supply should be immediately turned off (otherwise the lens sticks to Wall, causing the actuator to be damaged).
• In the case of TR jump other than to 100TR, the function shall continue to be processed even if the TR jump key is released. As for the CRG Move and 100TR Jump, the mechanism shall be set to the Tracking Close mode when the key is released.
• When the power is turned on/off the jump mode is reset to the Single TR (91) while the gain of the RFAMP is reset to 0 dB. At the same time all the self-adjusting values shall return to the default setting.

6.2 CHECKING THE GRATING AFTER CHANGING THE PICKUP UNIT

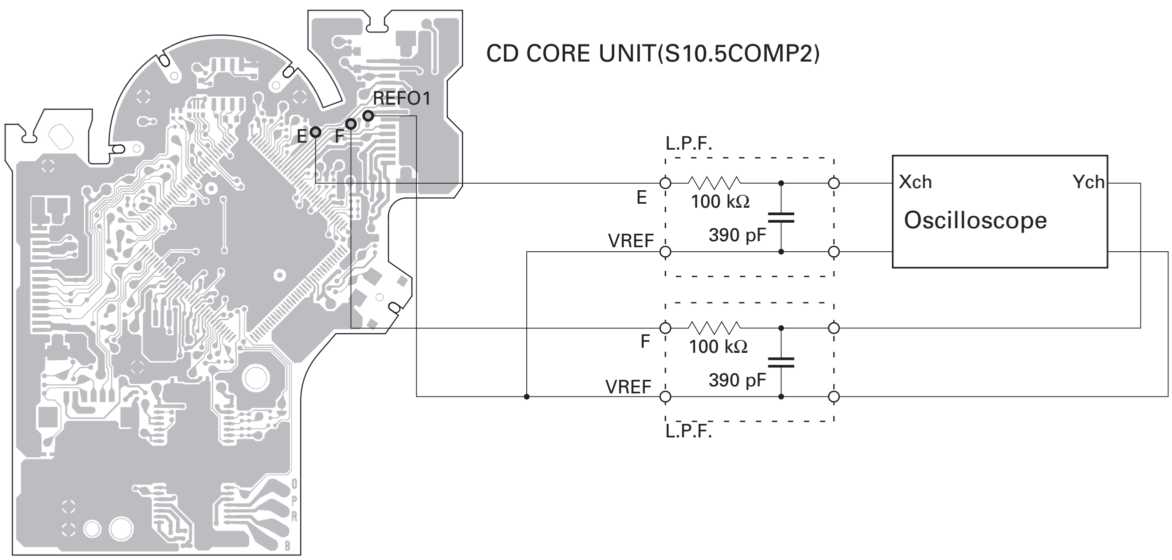
- **Note :**
  The grating angle of the PU unit cannot be adjusted after the PU unit is changed. The PU unit in the CD mechanism module is adjusted on the production line to match the CD mechanism module and is thus the best adjusted PU unit for the CD mechanism module. Changing the PU unit is thus best considered as a last resort. However, if the PU unit must be changed, the grating should be checked using the procedure below.

- **Purpose :**
  To check that the grating is within an acceptable range when the PU unit is changed.

- **Symptoms of Mal-adjustment :**
  If the grating is off by a large amount symptoms such as being unable to close tracking, being unable to perform track search operations, or taking a long time for track searching.

- **Method :**

• Measuring Equipment	• Oscilloscope, Two L.P.F.
• Measuring Points	• E, F, REFO1
• Disc	• TCD-782
• Mode	• TEST MODE



- **Checking Procedure**

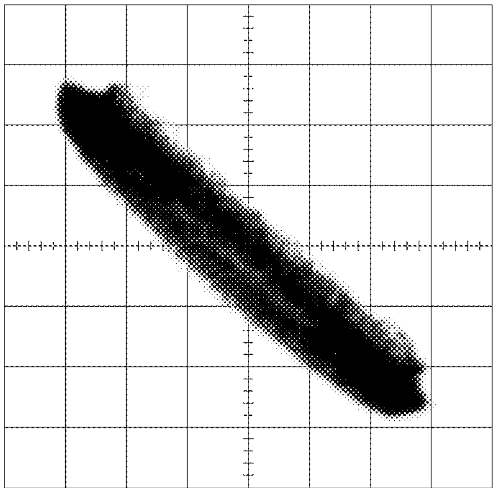
1. In test mode, load the disc and switch the 3 V regulator on.
2. Using the → and ← buttons, move the PU unit to the innermost track.
3. Press key 3 to close focus, the display should read "91". Press key 2 to implement the tracking balance adjustment the display should now read "81". Press key 3. The display will change, returning to "81" on the fourth press.
4. As shown in the diagram above, monitor the LPF outputs using the oscilloscope and check that the phase difference is within 75° . Refer to the photographs supplied to determine the phase angle.
5. If the phase difference is determined to be greater than 75° try changing the PU unit to see if there is any improvement. If, after trying this a number of times, the grating angle does not become less than 75° then the mechanism should be judged to be at fault.

- **Note**
  Because of eccentricity in the disc and a slight misalignment of the clamping center the grating waveform may be seen to "wobble" (the phase difference changes as the disc rotates). The angle specified above indicates the average angle.
- **Hint**
  Reloading the disc changes the clamp position and may decrease the "wobble".

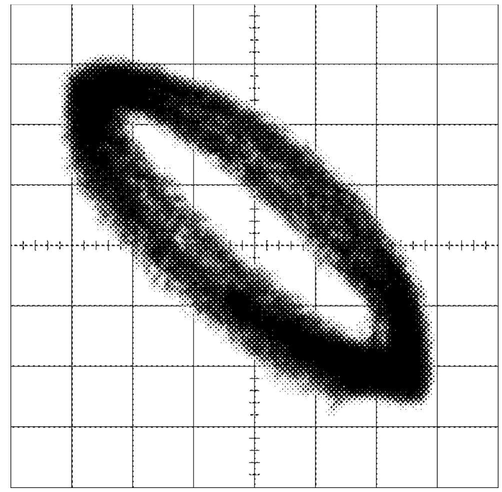
Grating waveform

Ech → Xch 20 mV/div, AC
Fch → Ych 20 mV/div, AC

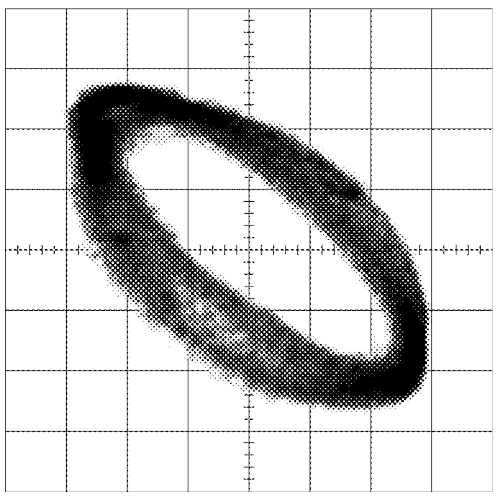
0°



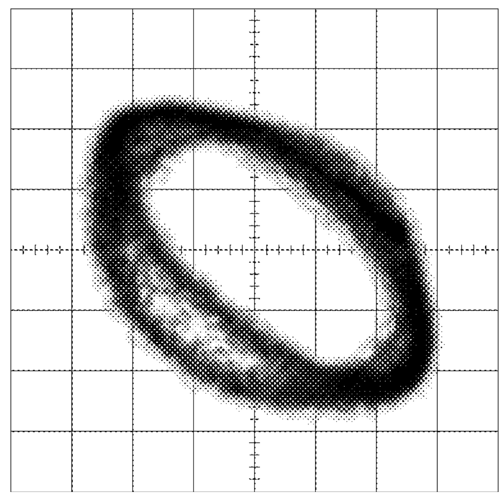
30°



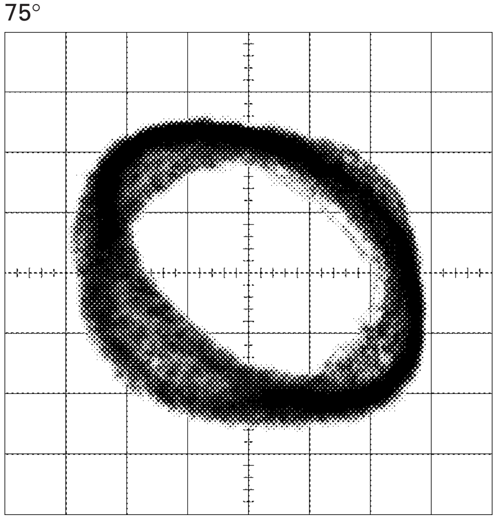
45°



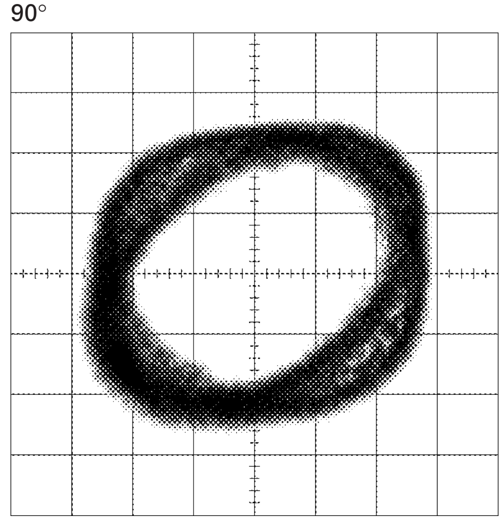
60°



75°



90°



6.3 ERROR MODE

● Error Messages

If a CD is not operative or stopped during operation due to an error, the error mode is turned on and cause(s) of the error is indicated with a corresponding number. This arrangement is intended at reducing nonsense calls from the users and also for facilitating trouble analysis and repair work in servicing.

(1) Basic Indication Method

1) When SERRORM is selected for the CSMOD (CD mode area for the system), error codes are written to DMIN (minutes display area) and DSEC (seconds display area). The same data is written to DMIN and DSEC. DTNO remains in blank as before.

2) Head unit display examples

Depending on display capability of LCD used, display will vary as shown below. xx contains the error number.

8-digit display	6-digit display	4-digit display
ERROR–xx	ERR–xx	E–xx

(2) Error Code List

Code	Class	Displayed error code	Description of the code and potential cause(s)
10	Electricity	Carriage Home NG SERVO LSI Com-munication Error	CRG can't be moved to inner diameter. CRG can't be moved from inner diameter. → Failure on home switch or CRG move mechanism. Communication error between microcomputer and SERVO LSI.
11	Electricity	Focus Servo NG	Focusing not available. → Stains on rear side of disc or excessive vibrations on REWRITABLE.
12	Electricity	Spindle Lock NG Subcode NG	Spindle not locked. Sub-code is strange (not readable). → Failure on spindle, stains or damages on disc, or excessive vibrations. A disc not containing CD-R data is found. Turned over disc are found, though rarely. CD signal error.
17	Electricity	Setup NG	AGC protection doesn't work. Focus can be easily lost. → Damages or stains on disc, or excessive vibrations on REWRITABLE.
30	Electricity	Search Time Out	Failed to reach target address. → CRG tracking error or damages on disc.
44	Electricity	ALL Skip	Skip setting for all track. (CD-R/RW)
50	Mechanism	CD On Mech Error	Mechanical error during CD ON. → Defective loading motor, mechanical lock and mechanical sensor.
A0	System	Power Supply NG	Power (VD) is ground faulted. → Failure on SW transistor or power supply (failure on connector).

Remarks: Mechanical errors are not displayed (because a CD is turned off in these errors).
Unreadable TOC does not constitute an error. An intended operation continues in this case.
Upper digits of an error code are subdivided as shown below:
1x: Setup relevant errors, 3x: Search relevant errors, Ax: Other errors.

6.4 IPOD TEST MODE

[Built-in iPod Test Mode Specification (Test mode for service representatives)]

[Purpose of this test mode]

This is a specialized mode that aims to check malfunction condition of H/U and measure the product performance.

[Features of this test mode]

Enables switching at any time to the iPod source
Disables communication with iPod
Disables indication of logos (Pioneer) on iPod
Functions regardless of connection of the iPod body to H/U

[How to shift to test mode]

The following describes how to enter and display the test mode.

① Disconnect the iPod body from H/U.
↓ [Background]
↓ If you try to start the test mode without disconnecting iPod, initial communication will start between iPod
↓ and H/U before you can enter the test mode. This will disable the iPod operation from the iPod body.
↓ To enable the iPod operation during the test mode from the iPod body, make sure to disconnect
↓ the iPod body from H/U.
↓
② Press [LIST] and [CLOCK] together to reset and start the test mode.
↓
③ Press such as the [SOURCE] key to switch to the iPod source.
↓
④ Connect the iPod body to H/U as need.

[Cancellation of test mode]

The test mode is cancelled by executing any of the following.
ACC_OFF ✻This applies to the case that the test mode is set to be cancelled with ACC_OFF.
B. Up_OFF
Pressing the H/U reset button

[Operational specifications for test mode]

The following specifies the key allocation and the actions.

Key	Action	Default	Remarks
→	Switches ON/OFF the charging circuit to iPod.	OFF	

[On-screen image]

The following are the on-screen display images.
The following are displayed as title information.

i	P	o	d	–	–	–	9

(9:) ON/OFF state of charging circuit (1: ON, 0: OFF)

6.5 SYSTEM MICROCOMPUTER TEST PROGRAM

● PCL Output

In the normal operation mode (with the detachable panel installed, the ACC switched ON, the standby mode cancelled), shift the TESTIN IC601(Pin 86) terminal to H.
The clock signal is output from the PCL terminal IC601(Pin 41).
The frequency of the clock signal is 625 kHz that is one 32th of the fundamental frequency.
The clock signal should be 625 kHz(±25 Hz).
If the clock signal is out of the range, the X'tal (X601) should be replaced with new one.

7. GENERAL INFORMATION
7.1 DIAGNOSIS
7.1.1 DISASSEMBLY

● Removing the Case (not shown)

1. Remove the Case.

● Removing the CD Mechanism Module (Fig.1)

1 Remove the four screws.

Disconnect the connector and then remove the CD Mechanism Module.

● Removing the Grille Assy (Fig.1)

2 Remove the two screws and then remove the Grille Assy.

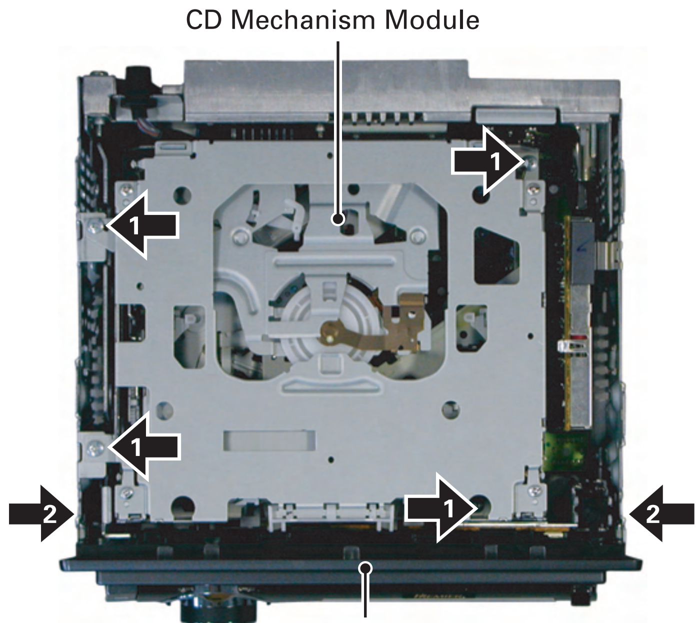


Fig.1

● Removing the Tuner Amp Unit (Fig.2)

1 Remove the screw.

2 Remove the three screws.

3 Straighten the tabs at four locations indicated and then remove the Tuner Amp Unit.

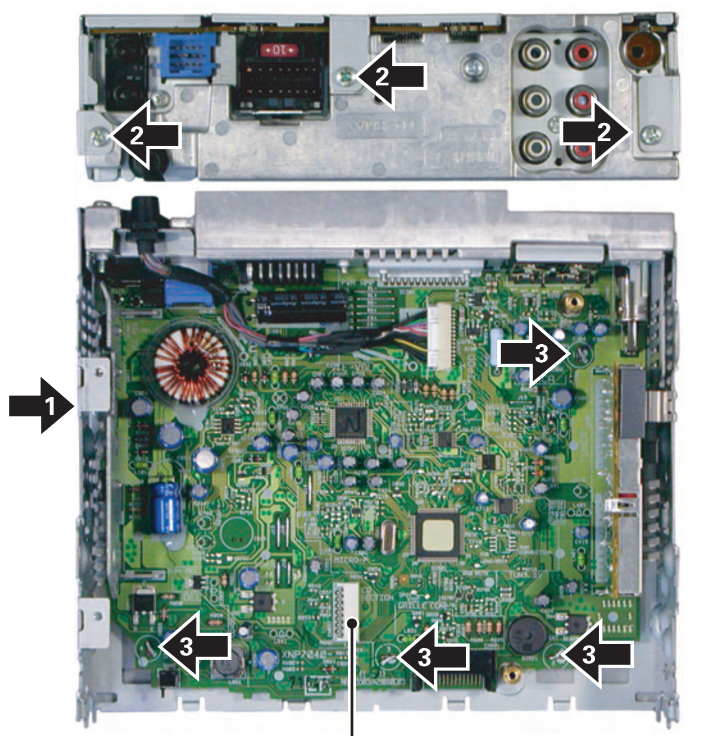


Fig.2

● How to hold the Mechanism Unit

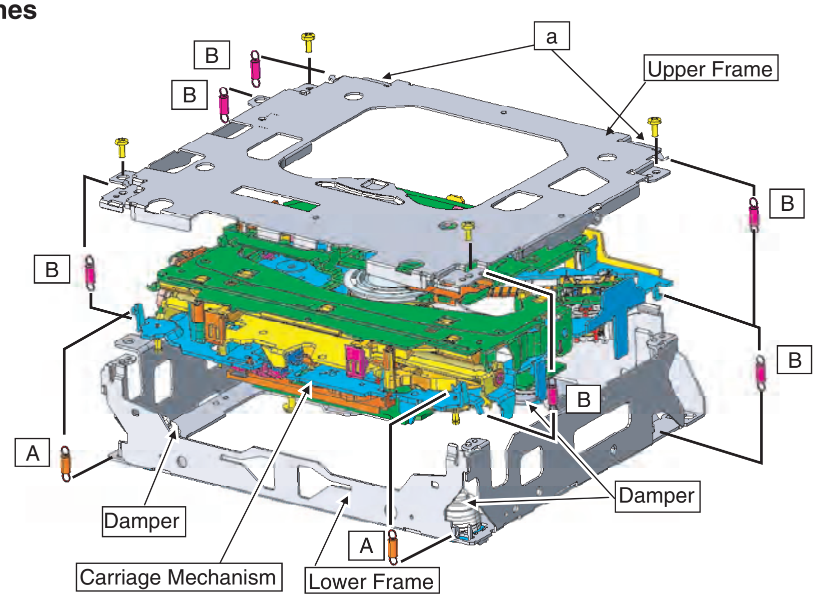
1. Hold the Upper and Lower Frames.
2. Do not hold the front portion of the Upper Frame, because it is not very solid.



● Removing the Upper and Lower Frames

1. With a disc inserted and clamped in the mechanism, remove the two Springs (A), the six Springs (B), and the four Screws.
2. Turn the Upper Frame using the part "a" as a pivot, and remove the Upper Frame.
3. While lifting the Carriage Mechanism, remove it from the three Dampers.

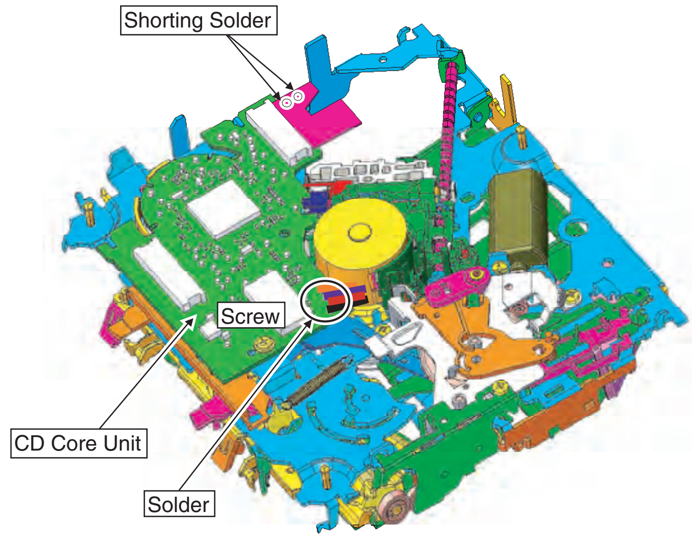
Caution: When assembling, be sure to apply some alcohol to the Dampers and assemble the mechanism in a clamped state.



● How to remove the CD Core Unit

1. Apply Shorting Solder to the flexible cable of the Pickup, and disconnect it from the connector.
2. Unsolder the four leads, and loosen the Screw.
3. Remove the CD Core Unit.

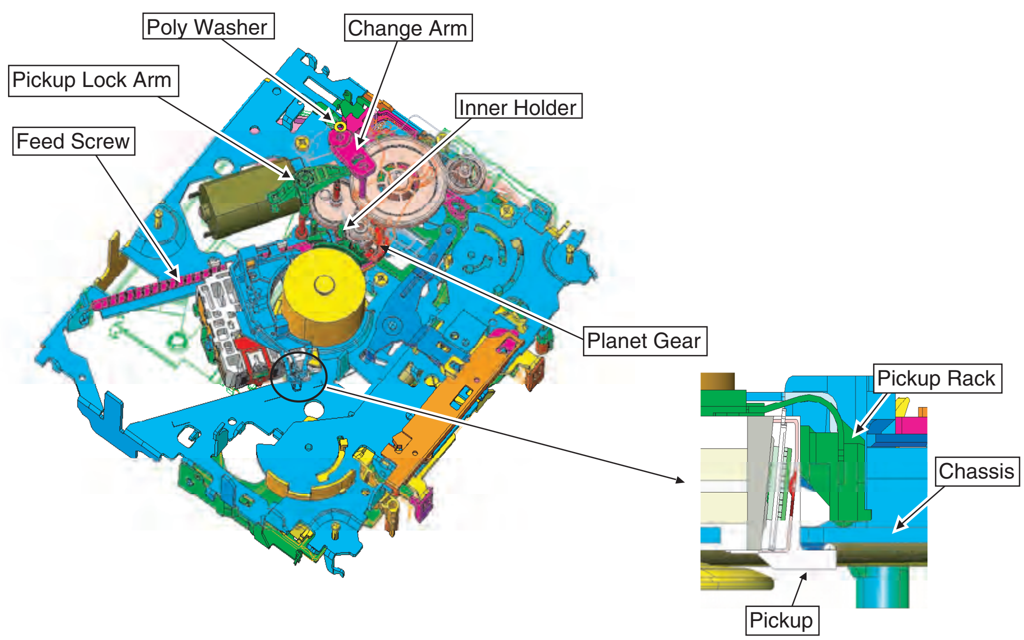
Caution: When assembling the CD Core Unit, assemble it with the SW in a clamped state so as not to damage it.



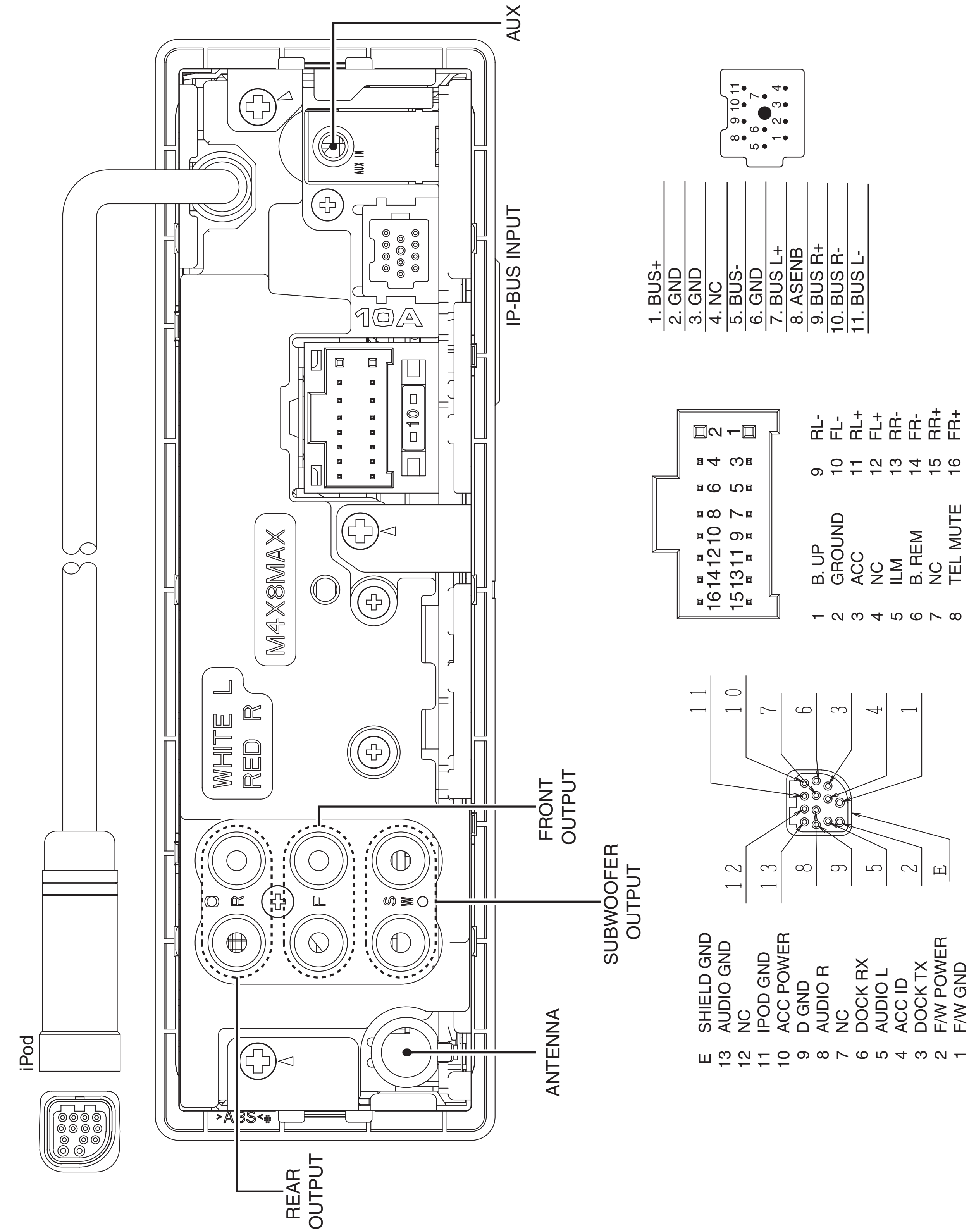
● How to remove the Pickup Unit

1. Make the system in the carriage mechanism mode, and have it clamped.
2. Remove the CD Core Unit and remove the leads from the Inner Holder.
3. Remove the Poly Washer, Change Arm, and Pickup Lock Arm.
4. While releasing from the hook of the Inner Holder, lift the end of the Feed Screw.

Caution: When assembling, move the Planet Gear to the load/eject position before setting the Feed Screw in the Inner Holder.
Assemble the sub unit side of the Pickup, taking the plate (Chassis) in-between. When treating the leads of the Load Carriage Motor Assy, do not make them loose over the Feed Screw.

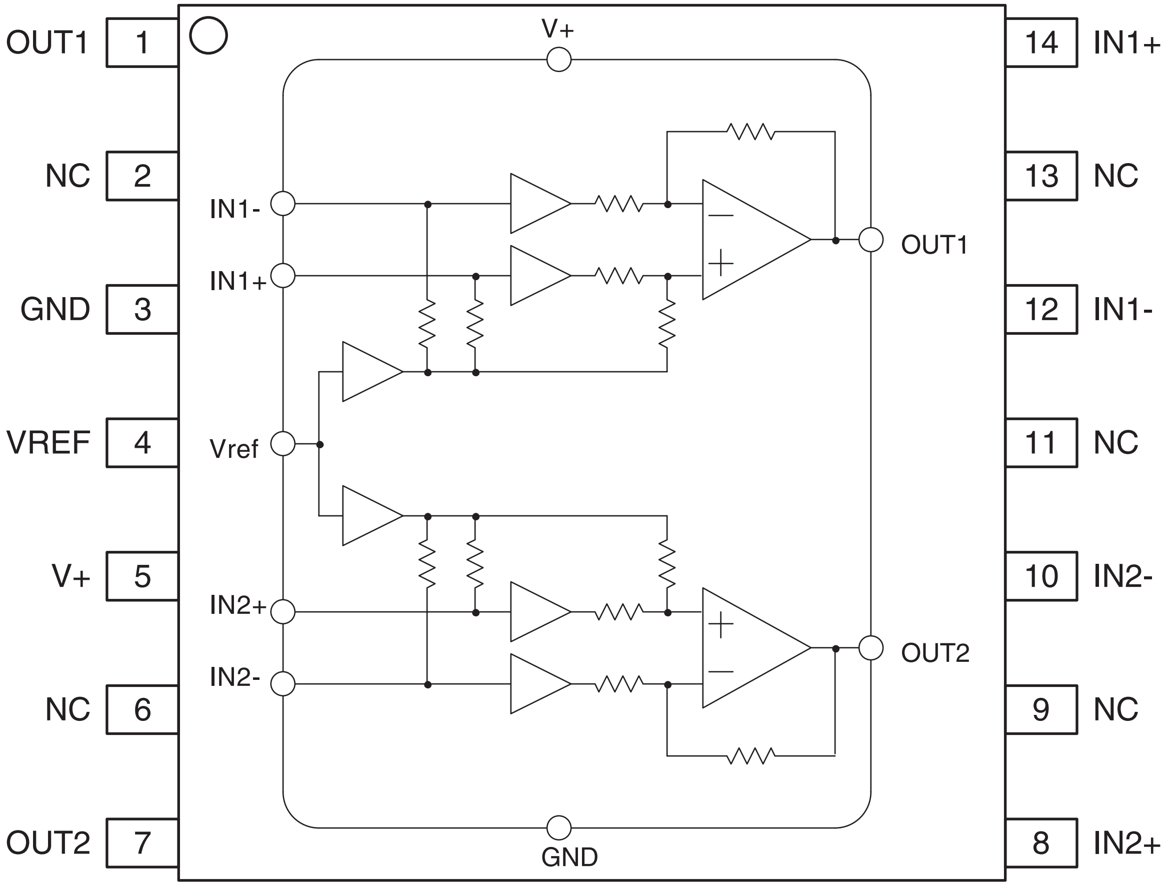


7.1.2 CONNECTOR FUNCTION DESCRIPTION



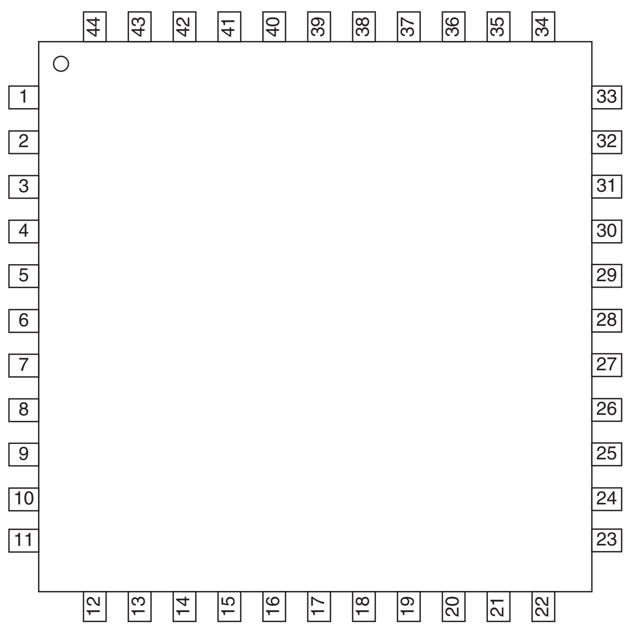
7.2 IC

NJM2794V

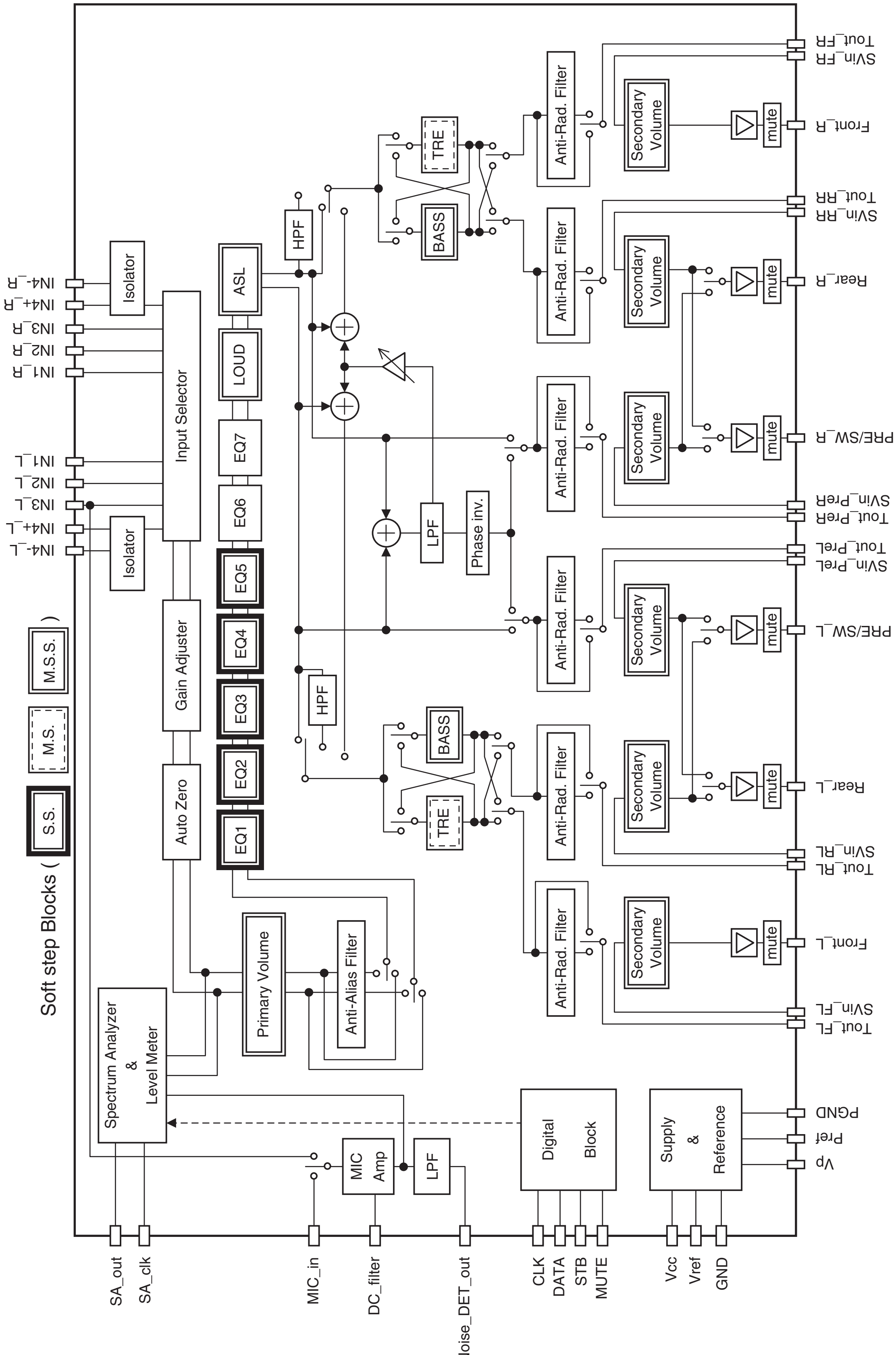


PML016B

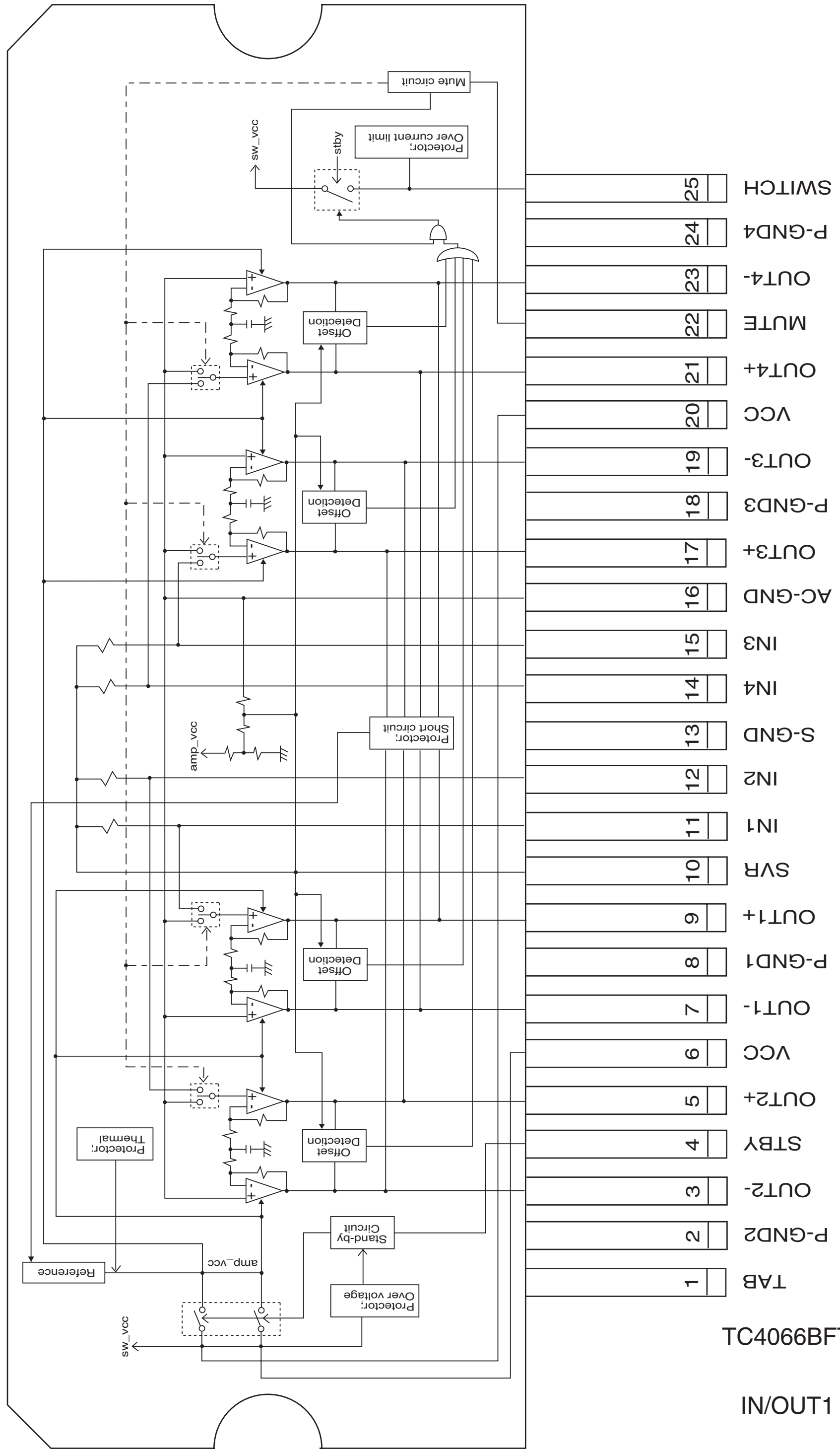
● **Pin Layout**



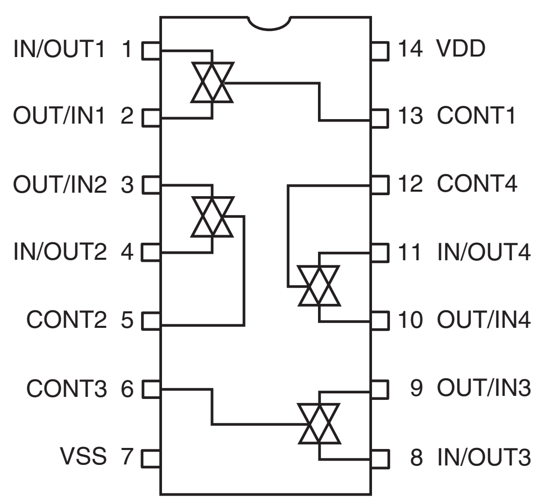
Block Diagram



PAL007C



TC4066BFT



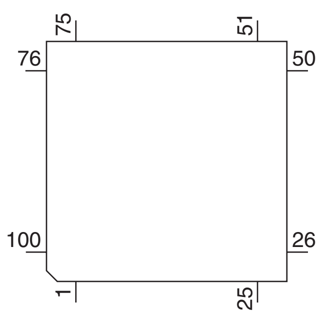
A B C D E F

● Pin Functions (PEG274A)

Pin No.	Pin Name	I/O	Format	Function and Operation
1	SYSPW	O	C	System power control output
2	KEYD	I		Wired remote control key input
3	NC			Not used
4	CDRST(RST2)	O	C	CD mechanism reset output
5	NC			Not used
6	BYTE	I		External data bus width change input
7	CNVSS	I		Processor mode change input
8	TELIN	I	C	TEL mute input
9	NC			Not used
10	RESET	I		Reset input
11	XOUT	O		Main clock output
12	VSS	I		GND
13	XIN	I		Main clock input
14	VCC1	I		Power supply input
15	NMI	I		NMI input
16,17	NC			Not used
18	VDCONT	O	C	CD mechanism power supply output
19	NC			Not used
20	OELPW	O	C	OEL power supply control
21	NC			Not used
22	BRXEN	I/O	C	P-BUS : Reception enable input/output
23	BRST	O	C	P-BUS : Reset output
24	PEE	O	C	BEEP sound output
25	NC			Not used
26	BRSQ	I		P-BUS : Service request input
27	RX			IPBUS : Input
28	TX		N	IPBUS : Output
29	DPDT		C	OEL display microcomputer communication data output
30	KYDT			OEL display microcomputer communication data input
31,32	NC			Not used
33	TXPOD		C	iPod data output
34	RXPOD			iPod data input
35,36	ROT1,0	I		Rotary encoder pulse input 1,0
37	ILMPW	O	C	Illumination power output
38	SWVDD	O	C	Display microcomputer chip enable output
39	DSENS	I		Detach sense input
40	FLPILM	O	C	Flap illumination output
41	PCL	O	C	Output for clock adjustment
42	EJTIN	I		Eject key input
43	TUNPDI	I		TUNER : Data input(PLL)
44	TUNPDO	O		TUNER : Data output(PLL)
45	TUNPCK	O	C	TUNER : Clock output(PLL)
46-50	NC			Not used
51	AUXON	O	C	EVOL : Source select SW(AUX)
52	IPODON	O	C	EVOL : Source select SW(iPod)
53-56	NC			Not used
57	EMUTE	O	C	EVOL : Mute
58	SACLK	O	C	Level indicator clock output
59	NC			Not used
60	VCC2	I		Power supply input
61	NC			Not used
62	VSS	I		GND
63	PID	O	C	Communication mode(UART) notification output
64	PSENSG	I		Connection sense input
65	PPOWER	O	C	Power supply control output

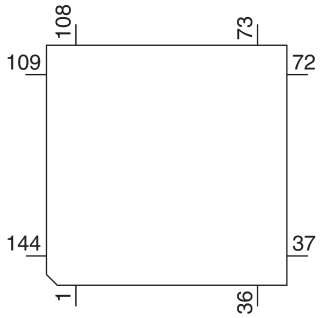
Pin No.	Pin Name	I/O	Format	Function and Operation
66	$\overline{\text{PSENS}}$	I		Connection sense input
67	DALMON	O	C	For consumption current reduction output
68	NC			Not used
69	$\overline{\text{TUNPCE2}}$	O	C	TUNER : Chip enable output(EEPROM)
70	TUNPCE1	O	C	TUNER : Chip enable output(PLL)
71	ROMCS	O	C	ROM correction chip select output
72	$\overline{\text{ASENS}}$	I		ACC sense input
73	$\overline{\text{BSENS}}$	I		Backup sense input
74	ROMCK	O	C	ROM correction clock output
75	ROMDATA	I/O	C	ROM correction data input/output
76	VST	O	C	EVOL : Strobe output
77	VDT	O	C	EVOL : Data output
78	VCK	O	C	EVOL : Clock output
79	IPPW	O	C	IPBUS : Driver power supply control output
80	ASENBO	O	C	IPBUS : Slave ACC sense output
81	$\overline{\text{ISENS}}$	I		Illumination sense
82,83	MODEL1,0	I		Model select input
84	NC			Not used
85	MUTE	O	C	System mute output
86	TESTIN	I		Test program input
87	PVSENS			iPod short circuit sense
88	NC			Not used
89	KEYAD			Wired remote control AD input
90	SAOUT			Level indicator input
91	CSENS			Detach sense input
92	NC			Not used
93	ASLIN			ASL input
94	AVSS	I		Analog GND
95	$\overline{\text{SL}}$			Signal level input(Field intensity)
96	VREF	I		Reference voltage input
97	AVCC	I		Analog power supply input
98	BSI/TESTDI			P-BUS : Input/Chip test program data input
99	BSO/TESTDO		C	P-BUS : Output/Chip test program data output
100	BSCK/TESTCLK		C	P-BUS : Clock output/Chip test program data clock

PEG274A



Format	Meaning
C	CMOS
N	Nch open drain

PE5547A



Format	Meaning
C	CMOS
N	Nch open drain

● Pin Functions (PE5547A)

Pin No.	Pin Name	I/O	Format	Function and Operation
1	ROMDATA	I/O	/C	E2PROM : Data input/output
2	ROMCK	O	C	E2PROM : Clock output
3	ROMCS	O	C	E2PROM : Chip select output
4	NC			Not used
5	LOEJ	O	C	LOAD/EJECT direction switching output
6	DSCSNS	I		Disc sense input
7	$\overline{8SNS}$	I		8 cm disc detection input
8	$\overline{12SNS}$	I		12 cm disc detection input
9	$\overline{HOME}$	I		HOME SW sense input
10	TEMP			Temperature information sense input
11	VDSENS			VD power supply short circuit/earth fault sense input
12	$\overline{ADENA}$	O	C	A/D reference voltage supply control output
13	ADC.VDD			Power supply for A/D converter
14	ADC.GND			Ground for A/D converter
15	FLMD0	I		Flash writing control terminal
16	$\overline{RESET}$	I		Internal microcomputer reset terminal
17	PULLDOWN	O	C	Pull-down
18	NC			Not used
19	$\overline{TESTIN}$	I		Chip check, test program start-up input
20	NC			Not used
21	BSI	I	N	P-BUS : Serial data input
22	BSO	O	N	P-BUS : Serial data output
23	$\overline{BSCK}$	I/O	N	P-BUS : Serial clock input/output
24	FTxD	O	N	Tx for flash rewriting
25	FRxD	I		Rx for flash rewriting
26	BRXEN	I/O	/C	P-BUS : Reception enable input/output
27	$\overline{BSRQ}$	I/O	/C	P-BUS : Service request input
28	NC			Not used
29	$\overline{FMODE}$	I		Flash self-rewriting mode start-up input
30	FLRQ	O	C	Flash self-rewriting reset voltage control
31	ROM	I		Open(EMPH)
32-36	NC			Not used
37	MCKRQ	O	N	CLOCK request
38	LRCKOK	O	N	LRCK reference enable
39	$\overline{PUEN}$	O	C	Pickup hologram power supply control output
40	CD3VON	O	C	CD + 3.3 V power supply control output
41	CONT	O	C	Servo driver power supply control output
42	VDCONT	O	C	VD power supply control output
43	CLCONT	O	C	CRG/LOAD-EJECT switching control output
44	CDMUTE	O	C	CD mute control output
45	TEST	I		Test terminal
46	$\overline{BRST}$	I		P-BUS : Communication reset input
47	REGS			Capacitor connection for standby
48	C.VDD			Power supply for internal microcomputer
49	C.GND			Ground for internal microcomputer
50	XTAL	I		Connected to the crystal oscillator
51	X.GND			Ground for the crystal oscillator
52	$\overline{XTAL}$	O		Connected to the crystal oscillator
53	X.VDD			Power supply for the crystal oscillator
54	DA.VDD			Power supply for DAC
55	LOUT	O		Output of audio for the left channel
56	DA.GND			Ground for DAC
57	REGC			Connected to the capacitor for band gap
58	DA.GND			Ground for DAC
59	ROUT	O		Output of audio for the right channel

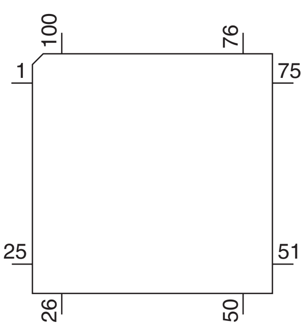
Pin No.	Pin Name	I/O	Format	Function and Operation
60	DA.VDD			Power supply for DAC
61	D.GND			Ground for digital circuits
62	D.VDD			Power supply for digital circuits
63	REG16			Capacitor connection for 1.6 V regulator
64	LRCK	O	C	3-wire audio LR clock output
65	SCKO	O	C	3-wire audio serial I/F clock output
66	DOUT	O	C	3-wire audio serial I/F data output
67-69	SVMON0-2	I/O	/C	Servo monitor input/output 0-2
70	SVMON3	I/O	/C	Servo monitor input/output 3(Ext MCK IN)
71	C33M	O	C	DRAM CLOCK
72	($\overline{RCS}$)	O	C	DRAM CS
73	(CKE)	O	C	DRAM CKE output
74	$\overline{RAS}$	O	C	Output of DRAM RAS
75	$\overline{CAS0}$(LDQM)	O	C	DRAM Lower CAS(LDQM) output
76	$\overline{CAS1}$(UDQM)	O	C	DRAM Upper CAS(UDQM) output
77	$\overline{WE}$	O	C	Output of DRAM WE
78	$\overline{OE}$($\overline{CAS}$)	O	C	DRAM OE(CAS) output
79-94	RDB0-15	I/O	/C	Input/output of DRAM data 0-15
95	IO.GND			Ground for I/O terminal
96	IO.VDD			Power supply for I/O terminal
97-108	RA0-11	O	C	Output of DRAM address 0-11
109	FD	O	C	Output of focus drive PWM
110	TD	O	C	Output of tracking drive PWM
111	SD	O	C	Output of thread drive PWM
112	MD	O	C	Output of spindle drive PWM
113	EFM	O		Output of EFM signals
114	ASY	I		Asymmetry input
115	ATEST	O		Analog tests
116	A.VDD			Power supply for the analog system
117	A.GND			Ground for the analog system
118	RFI	I		Input of RF
119	AGCO	O		Output of RF
120	C3T			Connection to the capacitor for detecting 3T
121	AGCI	I		Input of AGC
122	RFO	O		Output of RF(AGC)
123,124	EQ2,1	I		Equalizer 2, 1
125	RF2-	I		Reversal input of RF2
126	RF-	I		Reversal input of RF
127	A.GND			Ground for the analog system
128	A.VDD			Power supply for the analog system
129	A	I		Input of A
130	B	I		Input of B
131	F	I		Input of F
132	E	I		Input of E
133	REFOUT	O		Output of reference voltage
134	FE-	I		Reversal input of FE
135	FEO	O		Output of FE
136	ADCIN	I		FE,TE A/D converter input
137	TE-	I		Reversal input of TE
138	TEO	O		Output of TE
139	TE2	O		TE2
140	TEC	I		TEC
141	LD	O		Output of LD
142	PD	I		Input of PD
143	AD.VDD			Power supply for servo ADC
144	AD.GND			Ground for servo ADC

● Pin Functions (PEG272A)

Pin No.	Pin Name	I/O	Format	Function and Operation
1	NC			Not used
2	ROMDT	I/O	C	ROM correction data input/output
3	ROMCK	O	C	ROM correction clock output
4	REM	I		Remote control input
5	ROMCS	O	C	ROM correction chip select output
6	BYTE	I		External data bus width change input(VSS)
7	CNVSS	I		Processor mode change input
8,9	NC			Not used
10	$\overline{\text{RESET}}$	I		Reset input
11	XOUT	O		Clock output
12	VSS1			GND
13	XIN	I		Clock input
14	VCC1			Power supply input
15	$\overline{\text{NMI}}$	I		NMI input
16	NC			Not used
17	$\overline{\text{KS3}}$	O	C	Key strobe 3(Not used)
18-20	$\overline{\text{KS2-0}}$	I/O	C	Key strobe 2-0
21	NC			Not used
22	DSEL	O	C	OEL driver : Display data select
23	NC			Not used
24	CKD	O	C	OEL driver : Data transfer and driver clock frequency
25	NC			Not used
26	LS	O	C	OEL driver : Line sync signal
27	DPDT	I	N	System controller communication : Display data input
28	KYDT	O	N	System controller communication : Key data output
29-32	NC			Not used
33	OELD	O	C	OEL driver : Display data
34	NC			Not used
35	CLK0	I	C	OEL driver : Clock input for UART0
36	NC			Not used
37	$\overline{\text{RDY}}$	I	C	RDY signal input
38	NC			Not used
39	$\overline{\text{HOLD}}$	I	C	HOLD signal input
40,41	NC			Not used
42	$\overline{\text{RD}}$	O	C	Image ROM : Read strobe
43-45	NC			Not used
46,47	CS2,1	O	C	Image ROM : Bank address 1,0
48	$\overline{\text{CS0}}$	O	C	External extended ROM chip select(image ROM)
49	A19	O	C	Image ROM : Address bus 19 bit
50	A18	O	C	Non connection
51	A17	O	C	Image ROM : Address bus 17 bit
52	A16	O	C	Image ROM : Address bus 16 bit
53	A15	O	C	Image ROM : Address bus 15 bit
54	A14	O	C	Image ROM : Address bus 14 bit
55	A13	O	C	Image ROM : Address bus 13 bit
56	A12	O	C	Image ROM : Address bus 12 bit
57	A11	O	C	Image ROM : Address bus 11 bit
58	A10	O	C	Image ROM : Address bus 10 bit
59	A9	O	C	Image ROM : Address bus 9 bit
60	VCC2			Power supply input
61	A8	O	C	Image ROM : Address bus 8 bit
62	VSS2			GND
63	A7	O	C	Image ROM : Address bus 7 bit
64	A6	O	C	Image ROM : Address bus 6 bit
65	A5	O	C	Image ROM : Address bus 5 bit

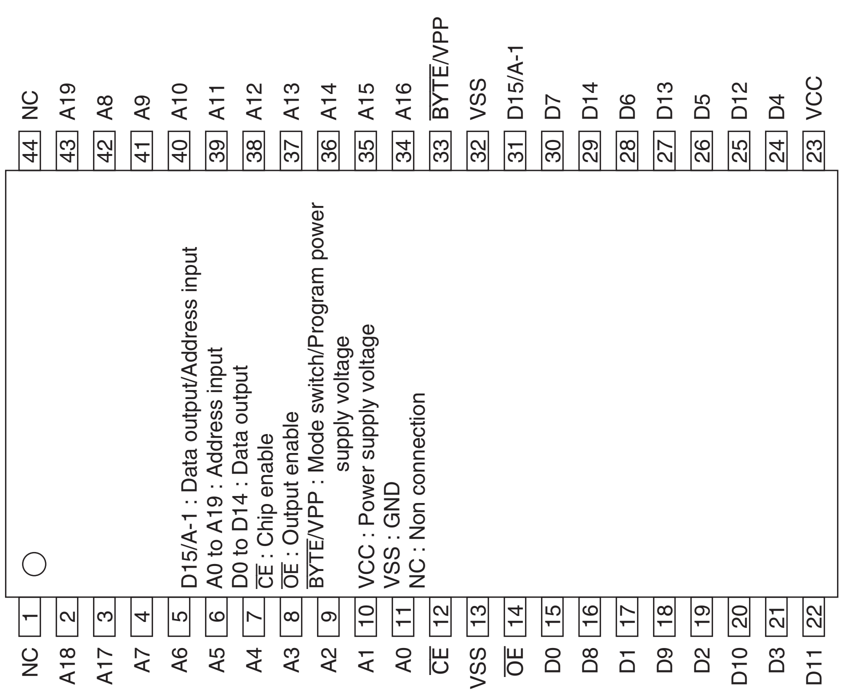
Pin No.	Pin Name	I/O	Format	Function and Operation
66	A4	O	C	Image ROM : Address bus 4 bit
67	A3	O	C	Image ROM : Address bus 3 bit
68	A2	O	C	Image ROM : Address bus 2 bit
69	A1	O	C	Image ROM : Address bus 1 bit
70	A0	O	C	Non connection
71	D15	I	C	Image ROM : Data bus 15 bit
72	D14	I	C	Image ROM : Data bus 14 bit
73	D13	I	C	Image ROM : Data bus 13 bit
74	D12	I	C	Image ROM : Data bus 12 bit
75	D11	I	C	Image ROM : Data bus 11 bit
76	D10	I	C	Image ROM : Data bus 10 bit
77	D9	I	C	Image ROM : Data bus 9 bit
78	D8	I	C	Image ROM : Data bus 8 bit
79	D7	I	C	Image ROM : Data bus 7 bit
80	D6	I	C	Image ROM : Data bus 6 bit
81	D5	I	C	Image ROM : Data bus 5 bit
82	D4	I	C	Image ROM : Data bus 4 bit
83	D3	I	C	Image ROM : Data bus 3 bit
84	D2	I	C	Image ROM : Data bus 2 bit
85	D1	I	C	Image ROM : Data bus 1 bit
86	D0	I	C	Image ROM : Data bus 0 bit
87	NC			Not used
88	JOYST	I	C	Rotary commander AD input terminal
89,90	NC			Not used
91	$\overline{\text{KD3}}$	O	C	Key data 3(Not used)
92,93	$\overline{\text{KD2}}$,$\overline{\text{1}}$	I	C	Key data 2,1
94	AVSS			Analog GND
95	$\overline{\text{KD0}}$	I	C	Key data 0
96	VREF	I		Reference voltage input
97	AVCC			Analog power supply input
98	$\overline{\text{DIM}}$	O	C	Terminal for Dimmer control
99,100	NC			Not used

PEG272A

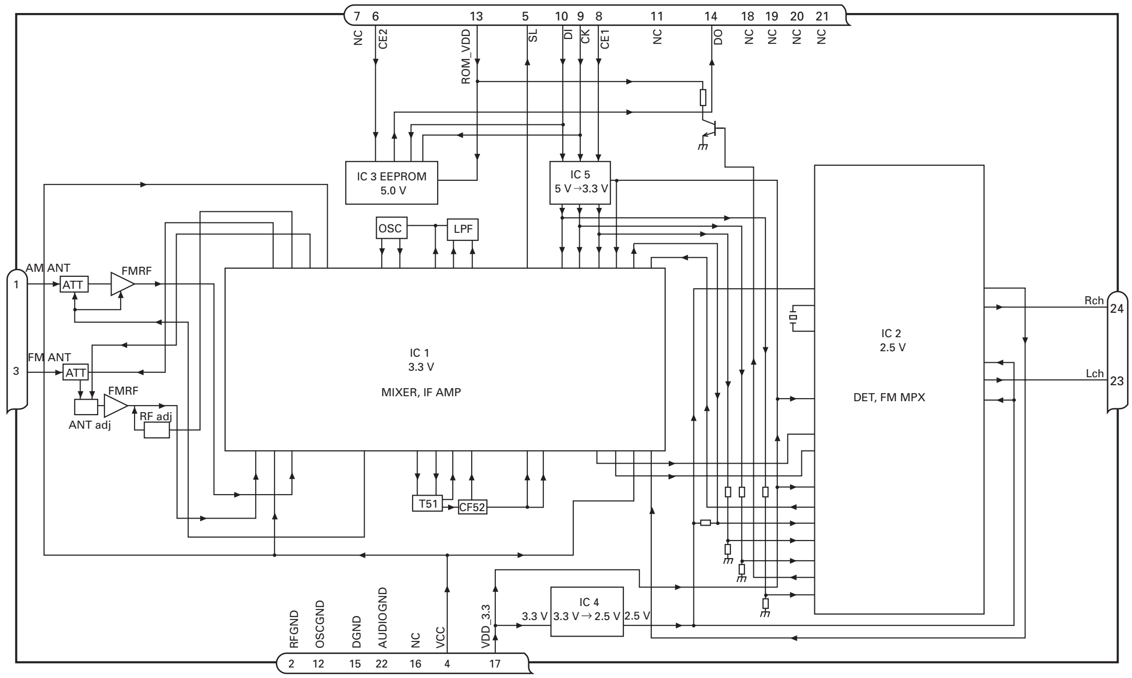


Format	Meaning
C	CMOS
N	Nch open drain

PD8168A(P5900IB)

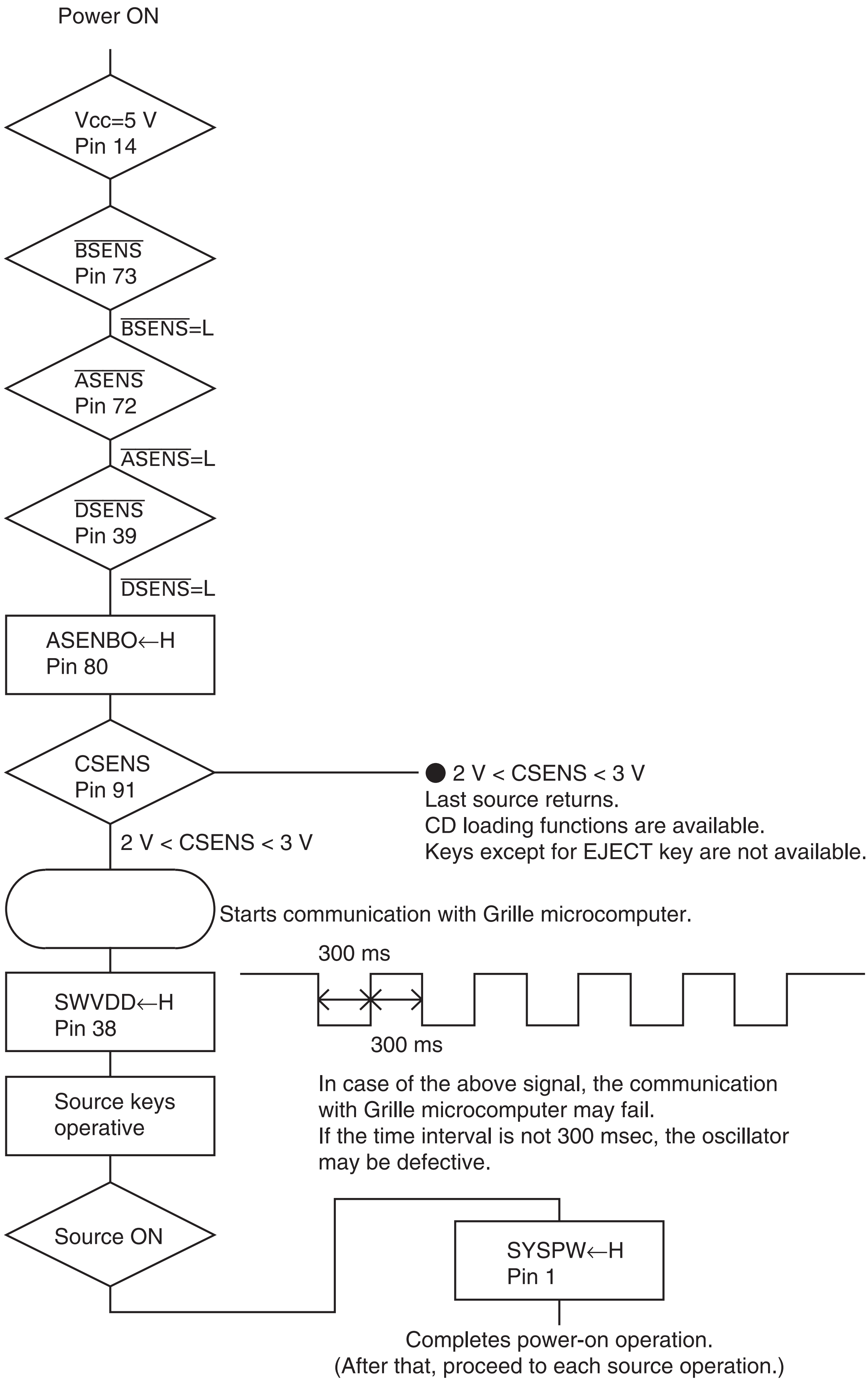


FM/AM Tuner Unit

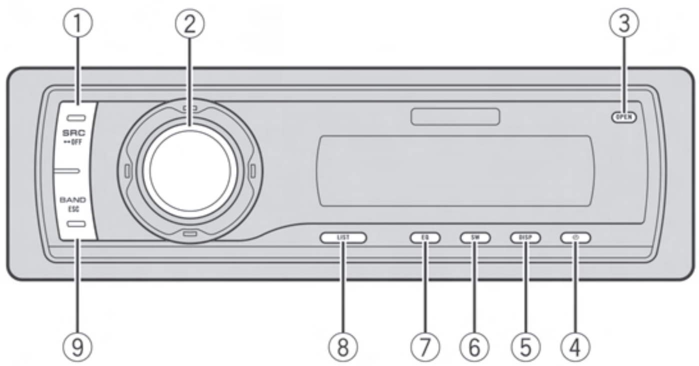


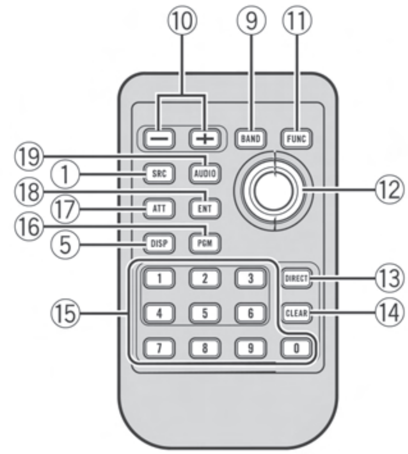
No.	Symbol	I/O	Explain	
1	AMANT	I	AM antenna input	AM antenna input high impedance AMANT pin is connected with an all antenna by way of 4.7 μH. (LAU type inductor)A series circuit including an inductor and a resistor is connected with RF ground for the countermeasure against the hum of power transmission line.
2	RFGND		RF ground	Ground of antenna block
3	FMANT	I	FM antenna input	Input of FM antenna 75 Ω Surge absorber(DSP-201M-S00B)is necessary.
4	VCC		power supply	The power supply for analog block. D.C 8.4 V± 0.3 V
5	SL	O	signal level	Output of FM/AM signals level
6	CE2	I	chip enable-2	Chip enable for EEPROM "Low" active
7	NC		non connection	Not used
8	CE1	I	chip enable-1	Chip enable for AF•RF "High" active
9	CK	I	clock	Clock
10	DI	I	data in	Data input
11	NC		non connection	Not used
12	OSCGND		osc ground	Ground of oscillator block
13	ROM_VDD		power supply	Power supply for EEPROM pin 13 is connected with a power supply of micro computer.
14	DO	O	data out	Data output
15	DGND		digital ground	Ground of digital block
16	NC		non connection	Not used
17	VDD_3.3		power supply	The power supply for digital block. 3.3 V ± 0.2 V
18	NC		non connection	Not used
19	NC		non connection	Not used
20	NC		non connection	Not used
21	NC		non connection	Not used
22	AUDIOGND		audio ground	Ground of audio block
23	L ch	O	L channel output	FM stereo "L-ch" signal output or AM audio output
24	R ch	O	R channel output	FM stereo "R-ch" signal output or AM audio output

7.3 OPERATIONAL FLOW CHART



8. OPERATIONS





What's What

Head unit

① **SOURCE button**
This unit is turned on by selecting a source. Press to cycle through all the available sources.

② **MULTI-CONTROL**
Move to perform manual seek tuning, fast forward, reverse and track search controls. Also used for controlling functions.
Turn to increase or decrease the volume.

③ **OPEN button**
Press to open the front panel.

④ **CLOCK button**
Press to change to the clock display.

⑤ **DISPLAY button**
Press to select different displays.

⑥ **SW button**
Press to select the subwoofer setting menu. Press and hold to select the bass boost setting menu.

⑦ **EQ button**
Press to select various equalizer curves.

⑧ **LIST button**
Press to display the disc title list, track title list, folder list, file list or preset channel list depending on the source.

⑨ **BAND button**
Press to select among three FM bands and one AM band and to cancel the control mode of functions.

Remote control

Operation is the same as when using the buttons on the head unit.

⑩ **VOLUME buttons**
Press to increase or decrease the volume.

⑪ **FUNCTION button**
Press to select functions.

⑫ **Joystick**
Move to perform manual seek tuning, fast forward, reverse and track search controls. Also used for controlling functions. Functions are the same as **MULTI-CONTROL** except for volume control.

⑬ **DIRECT button**
Press to directly select the desired track.

⑭ **CLEAR button**
Press to cancel the input number when **0** to **9** are used.

⑮ **0 to 9 buttons**
Press to directly select the desired track, preset tuning or disc. Buttons **1** to **6** can operate the preset tuning for the tuner or disc number search for the multi-CD player.

⑯ **PGM button**
Press to operate the preprogrammed functions for each source.

⑰ **ATT button**
Press to quickly lower the volume level, by about 90%. Press once more to return to the original volume level.

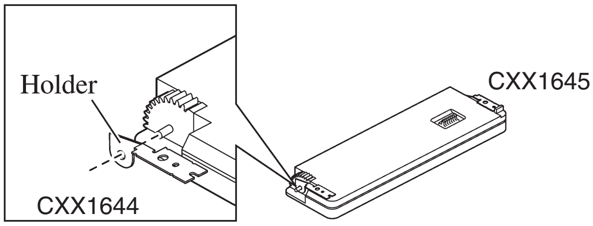
⑱ **ENTERTAINMENT button**
Press to change to the entertainment display.

⑲ **AUDIO button**
Press to select various sound quality controls. ■

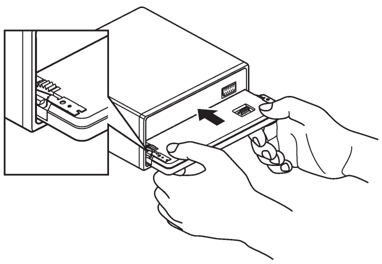
Fastening the front panel

If you do not plan to detach the front panel, the front panel can be fastened with supplied screws and holders.

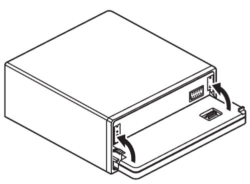
1. Attach the holders to both sides of the front panel.



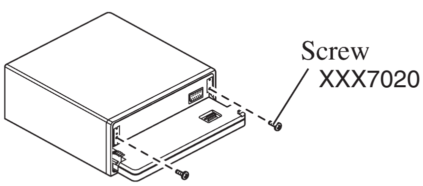
2. Replace the front panel to the unit.



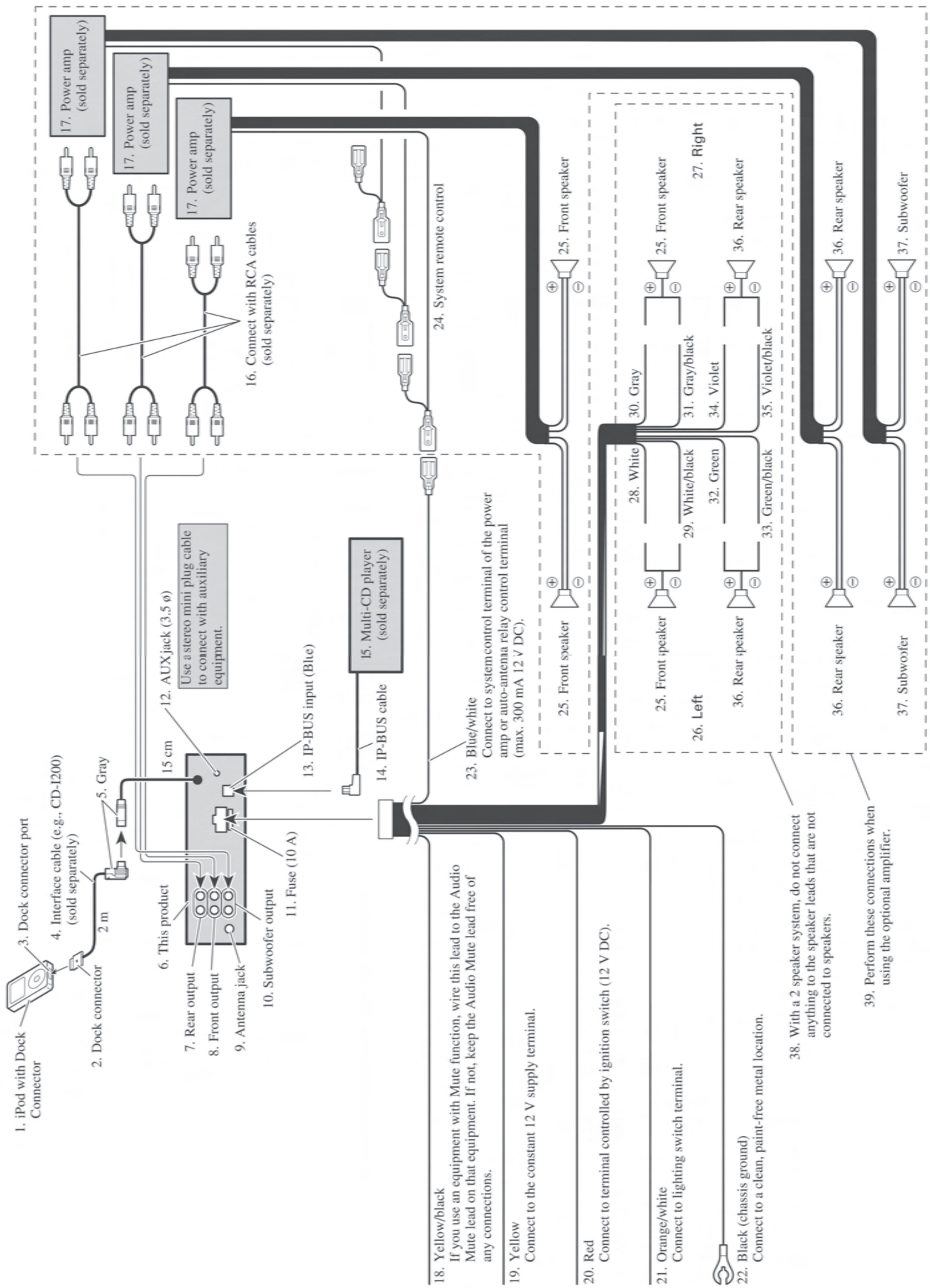
3. Flip the holders into upright positions.



4. Fix the front panel to the unit using screws.



Connection Diagram



Jigs List

Name	Jig No.	Remarks
Test Disc	TCD-782	Checking the grating
L.P.F.		Checking the grating (Two pieces)

Grease List

Name	Grease No.	Remarks
Grease	GEM1024	CD Mechanism Module
Grease	GEM1045	CD Mechanism Module



Before shipping out the product, be sure to clean the following portions by using the prescribed cleaning tools:

Portions to be cleaned	Cleaning tools
CD pickup lenses	Cleaning liquid : GEM1004 Cleaning paper : GED-008